DETERMINANTS AND DIFFERENTIALS OF INFANT MORTALITY IN MEWAT REGION OF HARYANA STATE, INDIA

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DECLARATION

Except where it is indicated otherwise, this thesis is my own work carried out during my Ph.D study in Demography Program, Research School of Social Sciences, the Australian National University.

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DEDICATION

I dedicate this work to my mother who took care of me in infancy and to my son who was an infant when I started this work.

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ABSTRACT

Mewat is one of the poorest and most backward regions of India. In such a setting, threats to the lives of infants and children are palpable and complex. This thesis investigated some of the factors which affect infant mortality in Mewat. The study was guided by three main objectives. First, to establish the effects of selected demographic, maternal health, cultural, socioeconomic and environmental factors on infant mortality in Mewat. Second, to establish the extent to which socioeconomic factors influenced infant mortality indirectly through their effects on each other and through maternal, cultural and environmental factors. Third, to examine the differences between groups, Meos and Non-Meos, in infant mortality and the possible reasons for the observed infant mortality differentials between the two communities.

To investigate this problem the author carried out a fieldwork in 1996 in six villages of the Mewat region. Information was obtained from 437 ever-married women who had experienced a live birth during the three years preceding the survey. Both quantitative and qualitative data were obtained. The quantitative data set comprised a structured questionnaire, while the qualitative component consisted of in-depth interviews, informal interviews and participant observation. The analytical model developed by Mosley and Chen (1984) was adopted to guide the study. Cox proportional hazards model was used to analyse the effects of explanatory variable on infant mortality.

The findings of the thesis showed that maternal age at birth, utilisation of colostrum, crowding and disposal of refuse in the courtyard emerged as the most important determinants of infant mortality in Mewat in order of importance. The children with low risk of mortality were those who were born to mothers aged more than 20 years, were given colostrum, lived in less crowded houses ($\leq$3 persons per room) and lived in households who do not dispose of refuse in the courtyard. Socioeconomic factors were shown to operate through demographic, cultural and environmental factors.

The results also suggested that Meo infants were more likely to die in infancy as compared to Non-Meo infant and socioeconomic and environmental factors were found responsible for infant mortality differentials between these two groups. The analysis suggested that eliminating the association between ethnicity and infant mortality may involve progressive actions towards eliminating differences in the socioeconomic, maternal health and child health care factors that are instrumental in observed infant mortality differentials. Raising age at marriage, promoting early initiation of breastfeeding and utilisation of colostrum, educating the general public to have greater awareness of environmental hazards and use of better hygienic practices could help in reducing infant mortality in Mewat.

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CHAPTER ONE

INTRODUCTION

1.1 Introduction

Infants and children are the most vulnerable group for morbidity and mortality. Consequently infant and child mortality has long been of interest to demographers. The inclusion of infant and childhood mortality in the set of twelve global indicators to measure progress towards the goal of 'Health for All by 2000' underlines the importance attached to reducing the level of infant loss, particularly in the developing countries where it is, at present, very high compared to the developed countries.

The study of infant and child mortality is an important part of demographic research for at least three reasons. First, infant and child deaths account for a high proportion of all deaths. In the 1980s, for example, under-five deaths made up approximately one-third of all the deaths throughout the world and in the developing countries they accounted for over half of all deaths (Kent, 1991: 5).

Second, it is important to study infant and child mortality because of the interrelationship between fertility and mortality, which is considered one of the most significant areas of policy oriented population research. Reduction in infant and child mortality is an important determinant of fertility (Omran, 1971: 2; Chowdhury, Khan and Chen, 1976: 258; Taylor, Newman and Kelly, 1976; Scrimshaw, 1978; Preston, 1978: 1-2; United Nations, 1984: 51; Okojie, 1991: 108-109; Barbieri, 1994: 27; Ohadike, 1995) and thus a reduction in infant and child mortality is widely considered as a precondition for successful population control (UN, 1972: 84; Mahadevan, 1979 cited in Mahadevan *et al.,* 1985: 1; Ross *et al.,* 1992: 7). Poor child survivorship, it is argued, raises desired family size, causes couples to have more children than they really want, and acts as a barrier to contraceptive practice.

Third, the study of infant and child mortality is also important because of the problem of the underrecording of children and, in particular, of deaths of young children in many developing countries. Because children form such a large fraction of the population of these countries, defects in recording them affect the accuracy of their whole demographic record. Assessment of levels and trends in mortality has remained a difficult task in such countries due to lack of appropriate data bases. Existing available data, although fragmentary and often unreliable, indicate that the problem is far more acute in the rural areas of developing countries, where the majority of developing countries' population lives.

Infant and child mortality is of great importance to parents, social policy makers, and health professionals. Unlike the causes of death for the elderly, a high proportion of deaths of children under age five in developing countries is believed to be preventable with fairly simple medical attention (Zheng, 1993). Thus, high infant and child mortality may present one of the greatest health problems in today's developing world, and research on the covariates of infant and child mortality, as well as mortality differentials in different socio-economic groups of a population, is particularly important for both social policy makers and health program planners in developing countries.

1.2 Background to the problem

The Government of India adopted a resolution on the National Policy for Children on 22 August 1974. In pursuance of the National Policy for Children, the Integrated Child Development Services (ICDS) Scheme was launched in 1975 to reduce malnutrition, morbidity and mortality of children in the age group 0-6 years. A combination of services (health checks, immunisation, supplementary nutrition, referral services, non-formal pre-school education) is provided under the scheme to achieve its goals. ICDS is currently the major national program of human resource development in India.

The focal point for the operation of the ICDS at the village level, is an *Anganwadi (AW),* which covers a population of 1000 in urban and rural areas and 700 in tribal areas. The woman who co-ordinates and offers the services in the *Anganwadi* is the *Anganwadi Worker* (*AWW*), who assumes a pivotal role in the ICDS structure through her close and continuous contact with the community. As the crucial link between the village population and the government administration, the *Anganwadi Worker* becomes a central figure in ascertaining and meeting the needs of the community she lives in.

India has registered an impressive decline in Infant Mortality Rate (IMR) since the inception of ICDS: the rate has declined dramatically from 140 per thousand live births in 1975 to 74 in 1995. But the level seems to have been stable since 1993. The IMR of 74 for all India is also quite high compared to 16 in Kerala State of India. Following the Alma Ata Declaration of 1978 to ensure 'Health for All' by the year 2000, the Indian Government set a target of 60 per 1000 for IMR to be reached by the year 2000 in the country as a whole, and in each state and union territory (Government of India, 1981: 7). But with a stable IMR since 1993 and with only two years remaining in which to achieve the target, the outlook is not bright.

Moreover, India is a big country with wide social, economic, demographic and regional differences. For instance, there is a large amount of regional variation in general living standards, levels of fertility and mortality, education attainment, and maternal and child health services. Consequently, substantial inter-state as well as intra-state differences have persisted in infant mortality in India. Differential strategies, especially strategies for the reduction of infant mortality, are therefore required to reduce the observed gap between states and between different communities within the states, and to improve child survival. Identification of effective strategies necessitates a better understanding of the determinants of infant and child survival, and of factors responsible for the observed variations in IMR in different communities. As noted by Mahadevan *et al.* (1985: 1):

> Knowledge of infant and child mortality among different cultural and social groups, and their determinants are essential for effective planning and implementation of many developmental programs in any country. Data on various aspects of mortality are needed for the judicious use of meagre inputs by different agencies of the government and the voluntary organisations in order to channelise the services in a balanced and equitable manner among the needy sections of the population.

In India, a major constraint in the identification of effective strategies relates to the inadequate data base. Even though registration of births and deaths is compulsory, routine reporting continues to be incomplete. At the village level, the problem of high infant mortality and poor child survival does not stimulate meaningful conscious discussion because infant deaths do not occur frequently enough to be perceived by community members as a problem of serious magnitude. In small villages, many villagers hardly see or hear of more than two deaths of infants with the present IMR of 74 deaths per 1000 live births and a birth rate of 28 births per 1000 population. Unaware of the success of other countries or even the state of Kerala in lowering the IMR to less than 20, they fatalistically accept the deaths of infants almost as the potters accept as inevitable the breakage of some of the pots they make (Jain and Visaria, 1988: 24). The fact that the recent level of the IMR is much lower than that of only about a generation ago has probably induced a certain degree of complacency about the pace of decline in infant mortality. Infant deaths, therefore, are not a priority concern in the community because of the small number of events.

In India, the health care providers also do not comprehend the seriousness of the problem, mainly because in the overall system of reporting, family planning targets, immunisation and malaria receive greater attention than do data on infant deaths (Kumar and Datta, 1988: 186). As a result, accurate data on the level of infant mortality are usually very hard to obtain, and information about socio-economic, biological and behavioural determinants of infant mortality is scarce.

This study seeks to identify some of the determinants of infant mortality in Mewat region of Haryana State, India. It also seeks to identify differentials in mortality between Meo and Non-Meo groups in that region. Furthermore, it attempts to understand the social dynamics and processes through which various proximate variables themselves are influenced. For example, it not only establishes linkages between place of birth and infant mortality but, also explores why in Mewat a large proportion of women gives birth at home? The question is raised as to why, despite the free availability of immunisation facilities, only a small proportion of the Meo children are fully protected against the six major killer diseases while others are either not immunised at all or drop out after taking one or two doses of vaccines. This inquiry is important for planning purposes.

The social dynamics and processes through which the suggested proximate variables are influenced can be better understood by undertaking micro-level case studies using anthropological approaches rather than conducting large-scale cross-sectional surveys (Khan, 1993). The research presented in this thesis is an attempt to examine some of the determinants of infant survival at a micro level in the Mewat region of India. The majority of the Mewat region is located in Haryana State of India. The Mewat region, named after its main inhabitants, the Meo group, consists of approximately 67 percent Meo population and 33 percent Non-Meo people (Mewat Development Agency, 1995a: 2). Formally Hindus, the Meos are said to have been converted to Islam, though estimates vary regarding the point of time at which conversion took place. Haryana State as a whole is fairly well developed and has the second highest per capita income in India, yet Mewat region is comparatively disadvantaged. There is a wide gap between Haryana State and Mewat region in the development indicators. The rate of literacy is only 32 percent compared with 49 percent in Haryana, and female literacy is only 7 percent compared to 22 percent in the rest of the state (Mewat Development Agency, 1995b: 7).

1.3 Review of literature on infant and child mortality: a global perspective

There is much research on the determinants of infant and child survival in demography. The present literature review has been organised into three parts. The first part deals with studies concerning the demographic factors influencing infant and child mortality; the second part covers research findings on how social and cultural factors influence infant and child mortality; and the third part deals with environmental factors.

1.3.1 Influence of demographic factors on infant and child mortality

Mothers' age at marriage, and age at childbirth, parity or birth order, birth interval, previous child loss, and age and sex of the child are important demographic correlates of infant and child mortality (Adioetomo, 1983: 14-15; Cleland and Sathar, 1984: 408-413; De Sweemer, 1984; DaVanzo, 1984: 313-315; Gubhaju, 1984: 134;

Hobcraft, McDonald and Rutstein, 1984; Rutstein, 1984: 74; Chidambaram, McDonald and Bracher, 1985: 2; Satar, 1985: 354; Amin, Mariam and Faruquee 1986: 36; Palloni and Tienda, 1986: 40-48; Pebley and Stupp, 1987: 50-51).

Age at first marriage is inversely related to infant and child mortality (Adioetomo, 1983: 14-15; Srivastava, 1990: 142). Adioetomo (1983: 14-15) indicates that babies born to mothers who married very young (before 18 years of age) tend to have a higher risk of dying. She argues that early marriage is associated with an early age of childbearing and since young women are not sufficiently physically mature for reproduction, their babies have high neonatal death rates. In addition to the biological factors, early marriage is also related to socio-economic factors such as income, education, occupation and place of residence. Women who marry very young often come from poor families with lower health status and low educational attainment (Mahmood and Zahid, 1993: 10).

The age of the mother at childbirth has been found in the literature to be closely related to infant and child mortality. Rutstein (1984: 74) in a cross-national comparative study based on World Fertility Survey (WFS) data drawn from developing countries, and Amin *et al.* (1986: 36) found that the age of the mother, parity and child mortality had a U-shaped pattern; mortality risks were highest among children born to very young mothers and those born to older mothers, and at first and highest parities.

The higher risk of dying among children born to older mothers may be a result of a decline in the efficacy in the reproductive system with age and economic pressure in the family, while the excess risk at young maternal ages is partly due to physical immaturity, lack of child care skills and lack of access to health care services (DaVanzo, Butz and Habicht, 1983: 394; Adlakha and Suchindran, 1985:482; Pebley and Stupp, 1987: 42).

Infant mortality is strongly associated with birth order (Chidambaram *et al.*, 1985: 21; Gubhaju, 1985: 19; Sathar, 1985: 354; Bhuiya and Streatfield, 1992: 454). The relationship between birth order and infant and child mortality risk generally forms a U-shaped curve. Bhuiya and Streatfield (1992: 454) found in Bangladesh that first births and birth orders five and higher were associated with relatively high mortality risks.

Infant mortality and birth order are connected through economic and biological factors. The firstborn child is more likely to be born to a mother who is both biologically and economically less prepared to bear and bring up a child. Babies at high birth orders are more likely to be born to older mothers who are physically weak (Rutstein, 1983: 27). Pebley and Stupp (1987: 43) found in Guatemala that irrespective of the age of the mother, firstborn children may be at a greater risk of mortality because their mothers' reproductive system is in the process of adapting to pregnancy, or because their mothers are less likely to receive adequate pre-natal care and to know how to care for themselves during pregnancy.

Birth intervals have been found to affect infant and child mortality and also to be affected by infant mortality: the birth interval will be short following an infant death. Many studies have reported that short birth intervals are associated with high risk of mortality (Swenson, 1981: 299-301; DaVanzo *et al.*, 1983; Al-Kadir, 1984: 32; Cleland and Sathar, 1984: 401-408; De Sweemer, 1984; Hobcraft, McDonald and Rutstein, 1985; Gubhaju, 1986; Palloni and Millman, 1986; Palloni and Tienda, 1986; Pebley and Millman, 1986: 71-74; Pebley and Stupp, 1987; Palloni, 1989: 164-166; Retherford *et al.*, 1989; Koenig *et al.*, 1990). The effect of a short previous interval on mortality has generally been found to be most pronounced during the first year of life, although a number of studies have reported effects extending through early childhood.

The mechanisms through which length of birth interval affects mortality are not fully understood. However, there are three mechanisms most commonly proposed for the adverse influence of short birth intervals on infant mortality. They are biological effects related to the 'maternal depletion syndrome'; behavioural effects associated with competition between siblings; and disease transmission.

The maternal depletion syndrome is a pattern of repeated, closely spaced pregnancies that provides inadequate time for the mother to recover fully from the adverse physiological and nutritional demands associated with pregnancy, parturition, and extended breastfeeding (Jelliffe, 1966). Under such conditions, an inhospitable intrauterine environment exists for the subsequent pregnancy, increasing the likelihood of poor reproduction outcomes such as intrauterine growth retardation, low birthweight and reduced length of gestation. All of these outcomes carry intrinsically higher risks of mortality during the early stages of life (Puffer and Serrano, 1975). A pregnant mother with short birth intervals still has very young children; she may not be able to attend ante-natal care services at all or may attend much later in the pregnancy than might otherwise be the case (Boerma and Bicego, 1992: 244). Furthermore, a mother with poor health and nutritional status and short birth intervals may not be able to produce adequate breastmilk for the infant (Pebley and Millman, 1986). However, Cleland and Sathar (1984: 417-419) concluded that the crucial determinant of infant and child well-being was the interval immediately preceding the birth of the index child and not the intensity of earlier childbearing.

The second mechanism, sibling competition, focuses on the allocation of resources in a family. Children born at short intervals are more likely to suffer from sibling competition for food, maternal care, and scarce family resources important to family health (Gribble, 1993). In this case it is the younger index child that is likely to suffer, either because the family is less likely to invest limited resources such as food or care in this child or simply because such resources are spread more thinly among siblings. The third mechanism through which short birth intervals may lead to higher mortality concerns the transmission of disease. A large number of young children within a household may not only facilitate the spread of infectious disease but also increase the severity of infection. Although this argument has been applied primarily to measles-related mortality, it may have relevance to other infectious diseases as well (Aaby, 1989; Alam, 1995).

However, it has been suggested that birth intervals that are too long may also be associated with increased mortality risks (Wolfers and Scrimshaw, 1975; Gray, 1981). Rutstein (1983) concluded that the relationship between longer birth intervals and infant mortality was unclear. Although long birth intervals may allow the mother more time to prepare for the next child, intervals that are very long may reflect the incidence of maternal health problems including foetal loss and stillbirths. Long intervals may also be a result of reporting errors, especially omission of dead children, which would lead to biases in the estimates.

Empirical investigations considering the effects of the subsequent birth on child survival are less numerous. In general, a short subsequent interval has been found to place the index child at increased risk of death during early childhood (Cleland and Sathar, 1984; Hobcraft *et al.,* 1985; Palloni and Millman, 1986; Pebley and Stupp, 1987; Retherford *et al.,* 1989).

Explanations for the adverse effects of a short subsequent birth interval on the survival of the index child are predicated on a different interpretation of sibling competition. According to this view, it is the first child in the pair- the older child- who may be placed at a disadvantage by the presence of a closely following younger sibling. Parental attention and investment in resources may be diverted to the newborn from the older child, who may be perceived as having survived the period of highest risk. Although this may entail direct competition between the two siblings, the role of a more indirect form of competition, breastfeeding and weaning, has received particular attention in the literature. In societies in which breastfeeding is both universal and extended in duration, the onset of a subsequent pregnancy may be sufficient cause for the mother to terminate abruptly the breastfeeding of the index child. Weaning, in the absence of the introduction of adequate nutritional substitutes for breastmilk, may result in a sharply elevated risk of mortality to the first child of the pair (Winikoff, 1980). In addition, the mechanism of disease transmission among closely spaced siblings may apply in the case of the subsequent birth interval.

Differentials in child survival have also been found to be closely associated with the survival status of the preceding child in the family. Several studies have documented the existence of a close correlation between the mortality risks of two successive births to a mother (Gubhaju, 1984: 134; Hull and Gubhaju, 1986; Das Gupta, 1990; Ebong, 1993: 12; Jhamba, 1995: 242-243; Das Gupta, 1997: 191-202). These studies suggest that children whose immediately preceding siblings are dead have a greater risk of mortality than the children whose older siblings are alive. For instance, in Nepal, the risk of infant and child mortality was substantially higher for the children where the immediately preceding sibling was dead, than among the children whose immediately preceding sibling was alive (Gubhaju, 1984: 134).

The influence of the survival status of the preceding child on the mortality risk of the index child is explicable in terms of the existence or lack of sibling competition for maternal attention and household resources (Hobcraft, 1987: 10; Koenig *et al.*, 1990: 254-256). The increased risk of mortality of an index child preceded by a sibling who died could be due to shared common biological, social and even behavioural problems affecting the mothers of such children (Winikoff, 1983: 232; Hobcraft, 1987: 10).

The sex of the child has been reported in certain societies to be an important factor influencing mortality risk in infancy as well as between ages one and five years. In some countries, particularly in South Asia, recent studies have documented excess female mortality in childhood as a reflection of the discriminatory attitude of parents towards female children (Wyon and Gordon, 1971:195; D'Souza and Chen, 1980; Chen, Huq and D'Souza, 1981; Hansluwka and Ruzicka, 1981; Nadarajah, 1983; Ruzicka and Hansluwka, 1983; Adlakha and Suchindran, 1985; Das Gupta, 1987: 81-83; Sathar, 1987a, b; Majumder, 1989: 62-64).

Ruzicka and Hansluwka (1983) hold the view that preference for male children accounts for the neglect of female children, and their higher mortality in early childhood. Women in general, and female children in particular, are at a disadvantage in the sense that they are often given less attention than boys when they become ill. In Bangladesh, the higher level of malnutrition among girls than boys was attributed to intra-family allocation of food between children of different sexes (D'Souza and Chen, 1980). According to Ware (1981: 47), at the time of weaning when the baby has to compete with other members of the family and when frequent decisions have to be made on how much time and money should be spent on the treatment of illness, male children are given preference over female children.

Nadarajah (1983) has revealed that in Sri Lanka, during the neonatal period when biological factors favouring females predominate, males had 29 percent higher mortality than females, while during the post-neonatal period the male mortality rate was only about five percent higher than that of females. The smaller gap in the post-neonatal mortality rate between the two sexes and the persistence of higher female mortality at ages 1-4 and 5-9 have been attributed, at least in part, to the influence of sex preference.

1.3.2 Influence of socio-economic and cultural factors on infant and child mortality

The socio-economic characteristics of the parents, such as income, level of education, place of residence, region of residence and occupation, have been found to affect infant and child mortality (Caldwell, 1979: 408-413; Caldwell and McDonald, 1981:79-95; Ewbank, Henin and Kekovole, 1986: 48; Ruzicka and Kane, 1985: 333-334). In any population, mortality rates, particularly the infant and early childhood mortality rate, vary between different social and economic strata. The economic conditions of a household, which can be measured in terms of the assets it holds and the various services and facilities it enjoys, have a significant negative effect on infant and child mortality (De Carvalho and Wood, 1987: 417-419; Meegama, 1980: 30-31; Amin *et al.,* 1986: 37; Kanitkar and Murthy, 1988: 307).

Household income, a measure of parents' financial ability to sustain good living standards for children, is often found to be inversely related to mortality but generally correlates positively with parents' educational attainment (Flegg, 1982; DaVanzo, 1984). De Carvalho and Wood (1978: 417-419) indicate that in Brazil per capita income was inversely associated with child mortality, and in particular infant mortality was sensitive to changes in per capita income. Anker and Knowles (1980: 180-182) found a weak but positive association between household annual per capita income and child survival to age three in Kenya. Ruzicka and Kane (1985: 333-334) also argued that poverty and infant and child mortality are positively associated.

In Bangladesh and Egypt, children born in richer households have been found to experience a lower risk of death in childhood than children from poor households (Bhuiya, 1989: 67-68; Casterline, Cooksey and Ismail, 1992). However, the effect of household conditions as measured in terms of household income appears to differ with the age of the child. Casterline, Cooksey and Ismail (1989: 25-30) for example, show that in Egypt household income had no significant effect on infant mortality but had a statistically significant effect on child mortality. The effect remained statistically significant even in the multivariate analysis.

The inverse relationship between family socio-economic status and infant and child mortality reflects differences in parental knowledge and skills as well as family resources relating to child care practice. Parents with higher household income are more capable of providing adequate care for their children. Bailey (1988) has argued that income is more likely to influence the level of child mortality 'indirectly through its effects on the rate of consumption of items affecting health such as food, housing, sanitation, medical care and education' (Bailey, 1988: 156).

Parental occupations also affect mortality (Suchindran and Adlakha, 1981). There has been a general consensus that parental occupation influences infant and child mortality mainly through its effects on income and consumption patterns, which include prenatal care services and child care practices in a household. Frenzen and Hogan's (1982) study of infant mortality in rural Northern Thailand concluded that 'parental ability to provide adequate infant care is particularly important in ensuring higher rates of infant survival' (Frenzen and Hogan, 1982: 406). Although husband's educational attainment and husband's occupation (often being used as a proxy for socio-economic status) have shown a positive influence on the use of health services, the relationship has not always been consistent.

The occupation of the mother is also considered to be an important variable affecting infant and child mortality, as it determines the amount of care a mother can render to a child. Maternal work status may have negative effects on child survival particularly through interference with breastfeeding (Knodel and Kintner, 1977; Cleland and van Ginneken,1988). Farah and Preston (1982: 372), in their study in the Sudan, found that children of working mothers experienced higher mortality than children of housewives. They attributed the higher mortality among the children of working women to three possible factors: that such children were deprived of adequate care; that women's work was an indicator of economic hardships in the household, since in Sudan full-time childbearing was a strongly sanctioned normative status of mothers; and that women who had lost a child were freed from child-care responsibilities and therefore were more likely to seek work. Hobcraft *et al.* (1984: 202-203) and Pant (1995: 130-131) also found that infant and child mortality is adversely allied with women's work, particularly outside the home. Pant attributed the elevated risk of infant and child death among working Nepalese mothers to the inadequacy of the time allocated to childcare and to fatigue suffered by working mothers.

Infant and child mortality varies according to the occupation of the mother (Arriaga and Hobbs, 1982: 173). An analysis of infant and child mortality in Chile in 1972-73 by Taucher (cited in Behm, 1979: 158-159) showed that infant mortality among infants of blue-collar female workers was double the rate for white-collar female workers, and the difference was larger for post-neonatal mortality. He also analysed the cause of death of children in the two occupational groups and observed that the greatest proportion of deaths to children of blue-collar workers was related to infectious diseases, especially diarrhoea, acute respiratory diseases and malnutrition. Behm (1979: 161-162) also noticed a sharp contrast in mortality in the first year of life among children born to parents of different occupational groups in Costa Rica, a country where a large part of the population benefits from social policies, especially in health and education. In 1975-76 the children of rural agricultural workers in this country had a mortality rate four to five times higher than that of children from the privileged group: farm owners, proprietors in the industrial and commercial sectors, high status professionals. Knodel and Chamratrithirong (1978: 36) also found that in both urban and rural areas in Thailand, children of professional, administrative and clerical women had the lowest mortality, while the highest mortality was among those whose mothers worked in farming, particularly as non-self employed agricultural workers.

One of the most often used socio-economic variables in the study of infant and child mortality is the level of mother's education. Numerous studies show that maternal education plays an important role in determining the level of infant and child mortality (Caldwell, 1979: 408-413; Cochrane, O'Hara and Leslie, 1980; Caldwell and McDonald, 1981: 79-95; Haines and Avery, 1982: 43; Frenzen and Hogan, 1982; Figa, 1984: 146; Hobcraft *et al.,* 1984: 197-221; Schultz, 1984: 221; Ware, 1984: 195-196; Mensch, Lentzner and Preston, 1985; Ewbank *et al.,* 1986: 48; Hull and Gubhaju, 1986: 116; Amin, 1988; Cleland and van Ginneken, 1989; Cleland, 1990: 400-419; Lindenbaum, 1990; Bicego and Boerma, 1991; Hobcraft, 1993, 159-175).

Caldwell (1979: 408-413) found a strong and negative association between infant and child mortality and the level of education of the mother. Using data from Nigeria he concluded that the step from primary to secondary level was twice as important as that from illiteracy to primary schooling. He argued that education of women was important in determining child survival even after control for a number of other factors, including such socio-economic characteristics of the husband as his educational level and occupation.

> Clearly, maternal education cannot be employed as a proxy for general social and economic change but must be examined as an important force in its own right. So important is it that it goes far towards mitigating the child mortality impact of the presence or absence of medical facilities in the area of residence (Caldwell, 1979: 408).

Hobcraft *et al.* (1984: 197-221) and Mensch *et al.* (1985) showed that increased levels of mother's education were associated with improved chances of child survival in a wide range of developing countries. Hobcraft *et al.* (1984) covered 28 World Fertility Surveys and Mensch *et al.* (1985) covered 15 countries and there was some overlap in coverage. In both the studies this association survived even after controlling for a number of other socio-economic variables, including the husband's education and occupation. Both studies also suggested that there was no threshold level of maternal education that needed to be reached before advantages in child survival began to accrue; even a small amount of education was usually associated with improved chances of child survival, and the gains generally increased with increasing levels of education.

An inverse association between maternal education and infant and child mortality was found in all major regions of the developing countries (Cleland and van Ginneken, 1989). However, the effect of maternal education was greater on child mortality than on infant mortality (Rutstein, 1984: 74; Ware, 1984: 195). Ware (1984) argued that the differentials in infant mortality by education tend to be much more significant in the latter half of the first year of life when the child starts to eat solid food than in the first half when the child is solely dependent on breastmilk.

Ware (1984) also argued that higher female education leads to women's better ability to make their own decisions and to a better understanding of the importance of hygiene and sanitation. Furthermore, she argued that education of the mother may also be a proxy for control of resources. However, Ware noted that it is difficult to separate the effect of income and education on mother's child care: in a situation where there is enough food, irrespective of mother's education, decisions will be different from those in a situation where difficult choices have to be made about who will get how much of a limited food supply.

Several pathways whereby mother's education might enhance child survival have been suggested. Sathar (1993: 234-236) reviewed some of the mechanisms that mediate the effect of maternal education on infant and child survival. According to Caldwell (1979: 408-413) these were a shift from 'fatalistic' acceptance of health outcomes towards implementation of simple health knowledge; an increased ability to manipulate the modern world, including interaction with medical personnel; and a shift in the familial power structures, permitting the educated woman to exert greater control over health choices for her children.

Lindenbaum (1990) stressed the apparent role of greater cleanliness among educated women in explaining differentials in child mortality in Bangladesh. Cleland (1990) reviewed the very mixed international evidence on reported incidence of diarrhoeal episodes by levels of maternal education, including some further studies on Bangladesh; this review suggested that greater cleanliness, if it exists, often fails to be translated into lower frequency of diarrhoeal episodes.

A second pathway of the mother's education, which has received considerable attention, is in ensuring that she uses health services for her children. Cleland (1990: 412) for example, concludes that:

> Education may have a modest effect on health knowledge and beliefs, but a pronounced effect on the propensity to use modern medical facilities, and adopt modern health practices, because of a closer social identification with the modern world, greater confidence at handling bureaucracies or a more innovative attitude to life among women who have some experience of school.

A third pathway is that maternal education may be associated with a greater emphasis on child quality, perhaps ensuring that fewer children are more likely to survive, have better food and attention and thus end up as healthier, better educated, more affluent, and emotionally better developed citizens. Evidence for this thesis is scant, although Levine *et al.* (1991), in a small study in Mexico, suggest that better educated mothers expect earlier intellectual and emotional development of their children.

Another pathway that has received attention is perhaps best referred to as the empowerment of women through education. Cleland (1990) identifies three components to this empowerment, which he terms instrumentality, social identification, and confidence. Instrumentality is the ability to manipulate and feel control over the outside world. Social identification is concerned with engagement with modern institutions and bureaucracies. Caldwell's original concerns with women's education altering power structures within the family should also be considered here. Most evidence for this pathway is indirect and can be summarised thus: educated women make greater use of health services for themselves and their children.

Maternal education may also affect child survival through its influence on demographic factors such as age at first marriage and age at first birth, parity, and child spacing. Rutstein (1984: 74), in a cross-national study based on the World Fertility Survey, found a U-shaped pattern of association between child mortality and maternal age at birth. Educated women marry and start childbearing later, thus avoiding the high risk to child health associated with early pregnancies (Hobcraft, 1993: 161; World Bank, 1993: 42). They cease childbearing earlier, thus avoiding the elevated risks of infant and child mortality associated with advanced maternal age (Cleland and van Ginneken, 1989: 82). Educated women also tend to make greater use of contraception, hence lengthening the intervals between births.

Analyses based on the Demographic and Health Surveys (DHS) appear to support some of the above suggested mechanisms through which maternal education influences child survival (Hobcraft, 1993: 173). The results indicate that better educated women have better knowledge of Oral Rehydration Salts (ORS) and that they are more likely to use it for treatment of diarrhoea. They are more likely to use medical facilities for the treatment of diarrhoea episodes, fever, and coughs. Educated women are more likely to have received prenatal care, to be immunised with tetanus toxoid during pregnancy and to have their pregnancies attended by trained personnel. Better educated women also have fewer malnourished children.

A study in a rural village in Cameroon found that formally educated mothers were more attentive to the health of their children, and noticed symptoms and identified illness more quickly than the uneducated mothers. They sought treatment for their children more often, especially biomedical treatment (Nyberg, 1993). Similarly, in Nepal educated mothers were more likely to use health facilities than uneducated mothers (Niraula, 1994: 158). Therefore, as a consequence of their greater likelihood of using health services, of avoiding high-risk pregnancies and of experiencing fewer pregnancies, educated mothers are considerably less likely to die in childbirth, and thereby orphan their children, with deleterious consequences.

However, evidence emerging from studies that controlled for the use of health services and maternal demographic factors (birth order, maternal age at birth, birth intervals) suggests that these factors do not explain much of the effect of maternal education on child survival. For example, using results from previous analyses carried out by Hobcraft *et al.* (1984, 1985) on the World Fertility Survey data, Cleland and van Ginneken (1989: 82-83) showed that demographic factors did not account for much of the effect of maternal education on child survival. Barbieri (1990: 32), using the data drawn from the 1986 Senegal DHS, found that the use of health services and family formation patterns did not mediate much of the effect of maternal education on infant and child mortality in Senegal. Similarly, Bicego and Boerma (1991), in a comparative study based on 17 countries that participated in the DHS program between 1986 and 1990, found that, with a few exceptions, birth order, maternal age at birth, and birth interval did not explain much of the effect of maternal education on child mortality and growth retardation.

There are also studies showing that educated mothers may become more effective at discriminating against little-valued children. Bhuiya and Streatfield (1992: 447-462) in a study of a rural area of Bangladesh, found that the positive effect of mothers' education on child survival is different for boys and girls. For boys, a change in a mother's education from 'no schooling' to '1-5 years' resulted in reducing the predicted risk of death by 45 percent, while for girls the reduction came to only 7 percent. Similarly, a change in mother's education from 'no schooling' to 'six or more years of schooling' resulted in a reduction of risk of 70 percent for boys, while for girls it was only 32 percent. Bhuiya and Streatfield used the Mosley and Chen (1984) framework and found that the curative aspect of personal illness control, and differential food distribution, are important proximate determinants in explaining the greater effect of mother's education on the survival of boys.

In his study of Bangladesh World Fertility Survey data, Huda (1980) also found mothers' education to be associated with a strongly feminine mortality ratio. Of mothers with an education above the primary level, female infants were three times as likely to die as boys; for mothers with no education, the ratio was 1.46. But the ratio for the 'above primary' category was based on only 77 deaths. In the older age group (unfortunately broad, from 2 to 10 years) where the number of deaths was larger, the ratios were lower, although still in the same direction. Huda himself has no explanation for this unexpected result, and relegates it to an appendix. His study depicts several other anomalous correlations, such as improved survivorship among undernourished children, which may bring the quality of the data into question.

In certain societies maternal education may not be significantly related to child survival. Casterline *et al.* (1989: 25-29) for example, showed that in Egypt maternal education was not significantly related to infant and child mortality with or without controls for a variety of other variables. Streatfield, Singarimbun and Diamond (1990: 453-455), in a small-scale study in Indonesia, found that educated women had greater awareness of correct immunisation schedules than did less educated women, but the effect of maternal education disappeared when the mother had correct knowledge of vaccine functions. They concluded that it was possession of that specific knowledge rather than formal education *per se* that led a mother to ensure that her children received available vaccines. Gursoy (1992), in a detailed small-scale study in a low-income area near Istanbul in Turkey, found that maternal education had little or no significant effect on infant mortality. Similarly, the analysis of the 1988 Uganda Demographic and Health Survey showed that maternal education had no significant effect on infant mortality (Ebong, 1993:11).

Differentials in child survival in developing countries have also been found to be closely associated with paternal education. In fact some studies have found that paternal education may be as important as or even more important than maternal education in determining infant and child mortality in some societies (Cochrane *et al.,* 1980; Caldwell and McDonald, 1981; Trussell and Hammerslough, 1983: 16; Aksit and Aksit, 1989: 571-572; Gursoy, 1992; Toros and Kulu, 1988 cited in Gursoy, 1994: 183). Figa (1984: 147), Amin *et al.* (1986: 42) and Ramanujam (1988: 266) argued that the education of the father emerges as an important factor in reducing infant and child mortality only in those countries where the majority of adult women are illiterate.

Rural-urban differentials in infant and child mortality are found especially in developing countries. Before the twentieth century, large urban areas in most of the developed countries had higher mortality than rural areas (Arriaga and Hobbs, 1982: 162-164). In contrast, urban areas of developing countries in this century are associated with lower infant and child mortality than rural areas (Gaisie, 1980: 34; Farah and Preston, 1982: 373; Haines and Avery, 1982; Trussell and Hammerslough, 1983: 14-17; Caldwell and Ruzicka, 1985; Amin *et al.,* 1986: 40; Vallin and Lopez, 1985; Pant, 1995: 130), because of differentials in the standard of living and access to public health facilities (Caldwell and Ruzicka, 1985; Amin *et al.,* 1986: 40). Behm and Vallin (1980: 29) observed that rural-urban mortality differentials were a reflection of differences in the socio-economic standards of the population in question, arguing that the place of residence *per se* did not explain mortality differentials. Hull and Gubhaju (1986: 116) argued that in Indonesia the threat of mortality to infants which comes from infectious diseases of the respiratory and digestive systems is about the same among people of similar economic class, whether they live in urban or rural areas. Guzman (1989: 135) observed that in Latin American countries, rural-urban differentials tended to disappear when social class and maternal education were controlled for. Although the place of residence had no significant net effect on infant mortality in Nepal, it was significantly related to child mortality even in the presence of controls for maternal education, father's education, mother's work status and ever-use of modern contraception (Pant, 1995: 142).

Regional mortality differentials in infant and child mortality have been found in many countries (Anker and Knowles, 1980; Behm, 1980: 4-5; Gaisie, 1980; Farah and Preston, 1982: 368; Jhamba, 1995: 109-156; Pant, 1995: 214-245). Regional mortality differentials may be due to differences in population composition with respect to individual characteristics, macro-economic conditions, the availability and accessibility of health services, and differences in physical environment, which may influence the incidence of disease.

De Carvalho and Wood (1978: 417-419) argued that regional variations in infant and child mortality in Brazil were a reflection of regional differences in socio-economic characteristics such as maternal education. Differences in infant and child mortality between the low and high-mortality regions in Nepal have been attributed mainly to differences in parental social, economic and cultural characteristics (Pant, 1995: 245-247).

On the other hand, Anker and Knowles (1980: 176-183) for Kenya, Farah and Preston (1982: 368) for Sudan, and Preston and Haines (1991: 109-116) for the United States of America, noted that once the effects of factors such as socio-economic levels and rural-urban residence were controlled, geographic differences in infant and child mortality reflect the influences of climate and disease vectors, and differences in the provision of health services. Physical environmental conditions such as climate may increase the incidence of infectious and parasitic diseases in some regions. Anker and Knowles (1980) identified the presence of malaria as a major cause of regional differentials in child mortality in Kenya.

There are studies on the causes of infant and child death. It is suggested by these studies that childhood diseases such as neonatal tetanus, whooping cough, polio and measles, which could be prevented through immunisation, significantly contribute to the high level of childhood mortality in developing countries (Foster, 1984: 119; Morley and Lovel, 1986: 272-283).

An increasing number of studies have shown the positive effect of breastfeeding on infant and child survival: a survival advantage, which is especially crucial in the Third

World environment (Jelliffe, 1974; Foster, 1984:119-140; Chen, Chowdhury and Huffman, 1980). Two main reasons have been cited for this positive relationship. First, breastfeeding can directly affect child survival through its role in nutrition intake, providing some defence against infections (Butz, Habicht and DaVanzo, 1984; Huffman and Lamphere, 1984; Habicht *et al.,* 1986; Palloni and Millman, 1986; Palloni and Tienda, 1986). Secondly, breastfeeding can indirectly influence infant and child mortality through its effect on birth spacing (Adlakha and Suchindran, 1985; Palloni and Millman, 1986; Palloni and Tienda, 1986). Early cessation of breastfeeding increases the risk of pregnancy leading to a short birth interval. In many developing countries breastfeeding can even influence mortality through its association with sexual abstinence. In societies where cultural norms prohibit sexual intercourse for nursing mothers, and when contraception is not used, breastfeeding is an important contributor to birth-spacing or interbirth intervals (Millman, 1985).

On the other hand, bottlefeeding is subject to contamination and the milk is often over-diluted. The contamination usually occurs in the preparation of the milk through the ignorance of the mother. A high level of bacterial contamination has been proposed as a prime reason for the high incidence of diarrhoea in bottlefed babies (Aykroyd and Kevany, 1973). Plank and Milanesi (1973) reported that in Chile in 1969-70, deaths before the age of three months among bottlefed babies occurred three times as often as deaths among infants who were wholly breastfed.

Puffer and Serrano (1973: 257-263), writing in the early 1970s about some American countries showed that large proportions of the infants who died in the first year of life had not been breastfed or had been weaned early. Adlakha and Suchindran (1985) clearly showed the beneficial effect of breastfeeding on the infant's survival, especially during the early months of life. For all the countries of their analysis, Jordan, Yemen, Egypt and Tunisia, the mortality rates for the non-breastfed were substantially higher than for the breastfed even when the effects of the other covariates were controlled. Bailey (1988) suggested that duration of breastfeeding plays a dominant role in infant and child survival in Sierra Leone. In Malaysia it was found that during the first month of life, infants who were breastfed throughout their first week of life had a neonatal mortality rate 16 per 1000 lower than those not breastfed (DaVanzo *et al.*, 1983: 395).

Breastfeeding is extremely important for infants, especially under generally unfavourable conditions in developing societies where drinking water and baby food are contaminated. Palloni and Tienda (1986) show that the effects of breastfeeding and pace of childbearing on mortality in the first six months of life are more pronounced when other resources are scarce; and that the protective effects of breastfeeding are greater among social groups with little or no access to community health services and information. Butz *et al.* (1984) also found that breastfeeding was an important determinant of infant and child mortality in the Malaysia Family Life Survey sample.

However, the advantages of breastfeeding for infant survival appear to be greater during the early months of life and to diminish by the end of the first year (Knodel and Kintner, 1977: 396; Wray, 1978: 218; Bhuiya, Wojtyniak and Karim, 1989: 360). After the first six months children need extra nutrition. The weaning period is the most critical period for the child with respect to mortality and morbidity (Winikoff, 1982: 113-114). The effect of breastfeeding on infant mortality risks beyond six months also depends on the nutritional quality of substitute food, as well as the sanitary conditions surrounding artificial feeding and the overall health condition of the infant's environment (Knodel and Kintner, 1977: 395).

1.3.3 Influence of environmental and infrastructural factors on infant and child mortality

In the existing demographic literature, types of toilet facilities (sanitation) and sources of drinking water are the two most frequently used measures of environmental effects on infant and child mortality in developing countries. Only a few studies have included other variables such as housing conditions (e.g. floor material) and lighting facility.

Availability of pure drinking water is very important for child survival because infants may be exposed to the risk of infection from contaminated water and through poor hygiene in prepared food at a very early age. DaVanzo *et al.* (1983: 396) in their study in Malaysia, indicated that the mortality of infants born into households with piped water was lower than the mortality of infants born into households where water was obtained from other sources such as wells, rivers or canals. It has been reported that poor or contaminated sources of drinking water are associated with an increased number of deaths from diarrhoeal disease in Latin America and particularly Costa Rica (Puffer and Serrano, 1965). It is generally believed that insalubrious water used to prepare breastmilk substitutes may increase morbidity and infant and child mortality. This was supported by studies in Malaysia, which showed that in homes without piped water or toilet sanitation breastfeeding was the most important determinant of infant survival (Butz *et al.,* 1984). Merrick's (1985) findings in urban Brazil confirmed that access to piped water in the household is likely to be of most direct benefit in lowering early childhood mortality by reducing exposure to water-borne diseases, particularly diarrhoea and dysentery. Victora, Smith and Vaughan (1986) found that environmental factors such as the availability of piped water in the house, access to an indoor flush toilet, and housing conditions were associated with childhood mortality variation in Brazil. In Colombia, Schultz (1985) argued that unavailable health services, poor sanitation, and crowding conditions all had negative effects on infant and child survival. Amin (1988) in his study on Bangladesh also pointed out that the availability of safe drinking water has an impact on infant and child mortality.

Human excrement and polluted water are the vehicles for a host of intestinal infections and parasitic diseases, which are responsible for half the infant deaths that occur in the highest mortality areas (Newland, 1981). In such an environment, an infant is constantly exposed to agents of infection, especially when it begins to crawl around and explore its surroundings. The presence of toilet facilities is associated with lower child mortality in Sri Lanka (Trussell and Hammerslough, 1983: 20) and with postnatal mortality in Malaysia (DaVanzo *et al.,* 1983).

Meegama (1980) pointed out that the incidence of diarrhoeal disease, which is one of the main causes of death in the first five years of life, depends mainly on two factors: the availability and use of hygienically constructed lavatories and the availability of uncontaminated drinking water:

> Insanitary lavatories or the absence of lavatories leads to the breeding of flies and to the transmission of disease either through food taken by the child or by flies settling on or near the mouth of an infant. Similarly, insanitary conditions can lead to the contamination of drinking water. This is especially so in those parts of rural Asia where drinking water is drawn from wells which are without any protective walls (Meegama, 1980: 17).

DaVanzo *et al.* (1983) found that infants born in households with a toilet facility were significantly less likely to die throughout their first year of life than children born into households without a toilet facility, a difference of 42 per 1000. Improved access to toilet facilities has been one of the factors that contributed to the decline in infant mortality in the Philippines (Martin *et al.*, 1983) and in Malaysia (DaVanzo and Habicht, 1986; Peterson, DaVanzo and Habicht, 1986). In addition to the availability of uncontaminated drinking water, some field studies in the worst conditions of urban slums and rural poverty in developing countries have shown that washing hands with soap and water will reduce diarrhoea caused by bacteria viruses and parasites by more than half (Khan, 1982).

Access to and use of maternal and child health services, both preventive and curative, directly influence child survival. Orubuloye and Caldwell (1975: 255-258) reported that in Nigeria the existence of public health services in small traditional villages undoubtedly reduced mortality. The decline in infant mortality in Nigeria between 1965 and 1975 was basically a result of the increased availability of rural health centres which carried out rigorous programs in maternal and child health, health education, and environmental sanitation.

Ayeni and Oduntan (1980) observed that population groups that are urban and have access to modern medical care, generally live in better socio-economic conditions and have, in general, mortality rates lower than the population groups depending mostly on traditional medicines or limited and low-quality health care. The United Nations' comparative study of the effects of socio-economic factors on child mortality indicated that in Nigeria and Peru, the only two countries that had appropriate data on health care, both access to and use of health services were positively related to child survival (Mensch *et al.*, 1985: 281). Similarly Ewbank and Gribble (1993) argued that the provision and use of health services were among the factors closely associated with the decline in infant and child mortality in Sub-Saharan Africa.

1.4 Review of infant and child mortality studies in India

A number of studies have been conducted on infant and child mortality in India. These studies show that many demographic and socio-economic factors, including environment, sanitation, medical care, nutrition and the cultural beliefs of the people determine the levels of infant and child mortality.

Studies have shown the effect of maternal age and parity, birth interval and sex of the child on infant and child mortality in India. A U-shaped or J-shaped curvilinear relationship was observed between infant mortality and the age of mother at the time of childbirth (Visaria, 1985: 1358; Sandhya, 1986; Jain and Visaria, 1988: 38; Kanitkar and Murthy, 1988); the relationship is stronger for neonatal deaths than for post-neonatal deaths. Khan (1988: 232) and Jain and Visaria (1988: 38) found that mortality tended to be high for children born to teenage mothers, lower for mothers aged 20-30 and increased for those born to mothers beyond 35 years of age.

The differentials in infant mortality by age of mother are attributed mainly to biological factors. Young mothers tend to be inexperienced, biologically immature and less able to take care of their children; this increases mortality among their children. Similarly, beyond age 30 the risk of pregnancy complications begins to increase because of the increasing inflexibility of the female organs, leading to higher numbers of infant deaths (Visaria, 1985: 1358).

A large number of studies shows strong evidence that the timing and order of birth have a significant effect on infant and child mortality. For example, a study carried out in 11 villages in Punjab State of India from 1955 to 1958, and popularly known as the Khanna Study (Wyon and Gordon, 1971), revealed that while the infant mortality rates were high for the first child, they were almost at the same level from the second to the sixth child, and began to rise again only for the seventh and later children. Gulick (1971, cited in Singha, 1975) reported for 11 villages in Punjab that childhood malnutrition is related to the order of birth. Ruzicka and Kanitkar (1973) had noted in India that the highest infant and neonatal mortality occurred among the first-order births. They also observed that the infant mortality rate was the lowest for the fifth-order births and started increasing afterwards. Rele and Kanitkar (1976) made similar observations in the Greater Bombay Fertility Survey and Arora (1980) in his analysis of data collected from hospital records in Greater Bombay. In the Infant and Child Mortality Survey (Registrar General of India, 1983), it was found that infant mortality was higher among women of higher parity. Khan (1988: 233) in Uttar Pradesh noted that the first order birth is associated with a higher chance of infant death, while Jain and Visaria (1988: 38) and Kanitkar and Murthy (1988: 304) found that the risk of infant death increases after fourth order births.

Wyon and Gordon (1971) in their Khanna study demonstrated that the risk of death in the first year for babies born less than two years after their closest sibling, was 50 percent higher than that of children born two to four years later, and almost twice that of children born after an interval of four or more years. Das *et al.* (1981: 11) in a study carried out in India, showed that the proportion of babies with a low birth-weight decreased from 12.1 to 1.8 percent as the interval between preceding birth and conception increased from one to five years. De Sweemer (1984: 71-72), in a study of 25 Punjabi villages in India, analysed the relationship of the length of the preceding interval and the subsequent interval to the age-specific probability of death of index children. He found that the preceding birth interval was significantly related to survival of the index child in the general population, as well as among index children whose preceding sibling died before their conception, or whose preceding sibling survived for at least 36 months after the birth of the index child. The subsequent birth interval has a significant influence on survival of index children only for intervals of less than 18 months and only up to the age of 18 months.

Several studies in India have shown that except for the early period of infancy, female mortality in childhood exceeds male mortality (Arora, 1980; Khosla, 1980; Isely, 1981; Das Gupta, 1987: 81-83), although few studies have focused on the sex differentials in infant and child mortality. Das Gupta in her study in rural Punjab found that during the neonatal period male mortality was higher than female mortality.

However, between the ages of one month and 24 months, when the majority of the deaths took place, the mortality of girls was nearly twice as high as that of boys.

The evidence of an excess of female deaths in late infancy and early childhood is usually interpreted as the result of parental discrimination against daughters in the allocation of food (Miller, 1981; De Sweemer, Kielmann and Parker, 1983; Sen and Sengupta, 1983) and health care (Wyon and Gordon, 1971; Miller, 1981; Das Gupta, 1987). While some ethnographic evidence garnered by Miller (1981) suggests that differential allocation of food may begin with breastmilk, there is more evidence for the discrimination against females in the allocation of food beyond infancy. In the Narangwal study, females at all ages received only 86 percent as many calories as males, and 84 percent as much protein, 69 percent as much calcium, 88 percent as much iron and 78 percent as much vitamin A (De Sweemer *et al.,* 1983). The under-allocation of food to females is also suggested by studies based on malnutrition data. Sen and Sengupta (1983) found females below five years of age to be more malnourished than males in two villages in West Bengal. Malnutrition was found to be more widespread among female children 0-6 years of age than males of the same ages following the 1978 floods in many parts of rural West Bengal (Kynch and Sen, 1983; Sen 1988). The relatively greater malnutrition of females was also found in the Narangwal study area (De Sweemer *et al.,* 1983).

Access to medical care in India also appears to be differentiated by gender. In fact, wider sex differentials have been found in medical care than in the allocation of food (Wyon and Gordon, 1971; Das Gupta, 1987). Research by Basu (1989) suggests that differences in the use of health care are sufficient, even without differences in the allocation of food, to explain sex differences in mortality. This research finds, in a sample of poor households, originally from two contiguous districts of Uttar Pradesh and four contiguous districts in Tamil Nadu, that more girls than boys get no treatment, or non-professional treatment, for illnesses, and that boys are more likely to be seen by a physician. Basu finds no link in her data between malnutrition and sex differences in mortality.

Kelly (1975), in a detailed study of mortality differences of females in Punjab and Kerala, attributes the greater survival of females in Kerala mainly to differences in medical care. Miller (1981), using hospital admissions data, reports that two or more boys are admitted to hospitals in the north for every one girl. In the south, the corresponding ratio is 1.2 to 1. Longitudinal data from two Bombay hospitals reveal significant urban differentials in male to female treatment ratios for adults as well as for children (Kynch and Sen, 1983). For the villages of the Khanna study in the Punjab, Das Gupta (1987) finds that in the first year of life, expenditure on medical care for sons is 2.34 times higher than for daughters. For these villages Singh, Gordon and Wyon (1962) had earlier found that fewer females than males had medical care during severe illness, and that males had a higher quality of care. In the Narangwal study (Kielmann *et al.,* 1983a) 48 percent of the female children who died had received care in the first 24 hours of their illness, compared to 64 percent of boys.

An important aspect of bias in the allocation of both food and medicine is that it appears to be parity-linked. Daughters born into families which already have one daughter are found to be at greater risk of mortality in Punjab (Das Gupta 1987). In the Narangwal study villages, the average weights and average heights were found to be lower for those children that had two or more male siblings than those with fewer male siblings (Kielmann *et al.,* 1983a). These differences were found to be even higher for those who had two or more male as well as two or more female siblings. In rural Uttar Pradesh, Simmons *et al.* (1982) find that girls born into families with a boy less than three years older, are more likely to die.

It has been postulated that the sex differential in infant and child mortality is greater among the higher castes and more propertied castes (Miller, 1981), in groups where dowry constitutes an essential and large part of a girl's marriage expenses (Miller, 1981), in areas where women are less economically active (Schultz, 1982), in areas of dry wheat cultivation (Bardhan, 1974), and in areas where village exogamy in marriage is more widespread and consequently women's autonomy within the household is weaker (Dyson and Moore, 1983). Differentiating between the north and the south Indian kinship systems, Dyson and Moore (1983) find that the northern kinship system undermines the cultural worth of females much more than does the kinship system of the south.

It is in the northern kinship system that cooperation and help are sought only from male blood relatives. Rules of marriage dictate a patrilineal system. Local village exogamy requires women to reside with their husband's family outside their natal villages, and consequently, prevents daughters from providing even emotional support to their natal families. Inheritance rules specify that women take no part in the intergenerational transfers of fixed property and dowry payments place greater burdens on the parents of daughters. Family honour depends on the purity of patriarchal descent that should be ensured by enforcing strict controls over women's sexuality by secluding them, curtailing their activities outside the home, and marrying them off at very early ages.

In contrast, in the southern states, the descent group tends to be endogamous, affinity is as important as descent in social, political and economic co-operation, and women sometimes inherit property. Accordingly, Dyson and Moore find that regions of excess female mortality and sex ratios unfavourable to women, high fertility, low ages at marriage of females, and high infant and child mortality, coincide with regions where kinship arrangements approximate those of the north Indian kinship system stereotype.

Miller views kinship arrangements and female labour force participation as 'emic' and 'etic' aspects, respectively, of the same phenomenon of female worth. In rural Punjab, too, the selective discrimination against females has been explained in terms of the strong patriarchal traditions which marginalise women and prevent them from making both economic and non-economic contributions to their natal family (Das Gupta 1987).

Many studies in India have confirmed the relationship between infant and child mortality and socio-economic status. The economic conditions of a household, which can be measured by the assets it holds and the various services and facilities it enjoys, have a significant effect in reducing infant and child mortality (Kanitkar and Murthy, 1988: 307). Jain (1988) argued that for India the condition of the household appears to have an independent effect on infant and child mortality. Similarly, Ruzicka and Kane (1985: 333-334) argued that poverty and child mortality are positively associated.

The occupation of the mother is an important variable affecting infant and child mortality, as it determines the amount of care that a mother can render to a child (Visaria, 1985: 1499; Sandhya, 1986: 96). Visaria (1985: 1499) found that infant and child mortality is adversely allied with women's working, particularly outside the home. Basu and Basu (1991: 96), using the 1981 census of India and another set of small-scale survey data, found a direct association between child mortality and female labour force participation. They found that the children whose mothers were working experienced higher mortality than the children whose mothers were not working, and attributed this higher mortality to the inability of working mothers to give adequate care to their children and to breastfeed them properly. However, their results have been contradicted by the results of the more recent study by Tulasidhar (1993) based on the same 1981 census data. Tulasidhar (1993: 184-189) found a statistically significant inverse relationship between child mortality and female labour force participation in India, thus lending support to other studies suggesting the favourable effect of maternal labour force participation on child survival. The difference in results obtained could be due to the fact that Basu and Basu used aggregated data, while Tulasidhar used disaggregated data and also used maternal education as a control variable.

The Registrar General of India (1983) revealed that infant mortality was higher among women workers engaged in production than those engaged in agriculture, which may be due to the likelihood that, since agricultural work is mostly seasonal, workers engaged in agriculture can bestow more attention on their infants compared to production workers. Kanitkar and Murthy (1988: 307) documented a negative association between landholding and infant and child survival in India.

Differentials in child survival in developing countries are strongly associated with the education of the mother (Das Gupta, 1989: 23). Nag (1983: 887), Jain (1988) and Visaria (1985: 1399), found that in India education of the mother was the most significant factor in reducing infant and child mortality. Similarly, Infant and Child Mortality Survey 1979 (Registrar General of India, 1983), Ramnath (1980) in his study of three states of India, Das Gupta (1990) and Kost and Amin (1992) in Punjab found an inverse relationship between maternal education and infant and childhood mortality. Das Gupta (1989: 20-21) in her study on Punjab argued that education of the mother enables her to make use of various services such as health facilities and other means of saving her children from death. However, Sandhya (1986: 95) in her study on Andhra Pradesh suggested that mother's education would show a negative correlation with infant mortality only after crossing a transitional stage, defined as middle-level schooling.

There has been little exploration of whether the effect of the mother's education on child survival is equal for the two sexes. Conflicting results have been obtained in the studies which have tried to explore this effect. Simmons *et al.* (1982) in their study in rural Uttar Pradesh, a northern state, found that mother's education only improved the survival of daughters. There was a strong effect even with the introduction of variables for which education might be a proxy, such as mother's age and health services. On the other hand, in a country-wide economic analysis of rural India, Rosenzweig and Schultz (1982) found mother's education to be weakly associated with daughter survival in both household and district-level data. Since their analysis was not conducted within regional strata, it is possible that some of the effects of mother's education were lost in the composite figures (Schultz, 1984).

In another study (Kelly, 1975), the high sex ratio of reported births was seen to decline with increasing father's literacy in Ludhiana district, Punjab, in north India. The sex ratio of births to fathers with no education was 114 boys to 100 girls; for fathers with an education beyond high school, it was 108 boys to 100 girls. The author's hypothesis was that among the uneducated an unusually high number of females were born and died without either event being registered. Although information on mother's education was not available to her, Kelly assumed that a woman's education was to some degree correlated with that of her husband.

Das Gupta (1987) in her study of Ludhiana district, Punjab, found girls born to women with some education to be at greater risk of dying (relative to boys) than those born to women with no education. The numbers from which the conclusions were drawn are limited: the educational divisions were 'none' and one or 'more years', and mortality rates during the first five years of life were based on fewer than 40 deaths. In a later study, Das Gupta (1990) found that the excess mortality of second and later daughters was greater for the children of more educated mothers.

However, Bourne and Walker (1991), using the 1981 Census of India to determine the relative effects of mother's education on the child mortality of boys and girls, found that a mother's education has an even greater effect on the survival of daughters than sons, particularly in the northern states. The average education effect for northern boys by age five reduces deaths by 77.44 per 1000; for northern girls, the average education effect reduces death by 95.87 per 1000, a difference of 18.3 deaths per 1000, or almost 2 percent. The fact that the effect of education is so much greater than that of rural or urban residence also supports the findings of many researchers that education is not merely equivalent to increased wealth. The mechanism through which maternal education increases the survival of female children appears to be a reduction in the neglect of the nutritional and medical needs of daughters.

There are studies on the determinants of regional variations in infant mortality in India (Dyson and Moore, 1983: 35-39; Nag, 1985; Jain, 1988). Dyson and Moore (1983) grouped the main states of India into two basic demographic regions: the north and the south including the states in the east. They found that 'in contrast to the north, states in the south and the east are characterised by ...lower infant and child mortality...' (p. 42). The authors attributed these regional differences in infant and child mortality to lower female autonomy under the northern kinship system and hypothesised that 'even...in the absence of modern health education and services - differences in kinship structure and female autonomy between north and south, may influence patterns of child care, and hence child mortality' (p. 50).

Nag (1983) compared the states of Kerala in the south with the state of West Bengal in the east. He attributed the lower mortality level in Kerala 'mostly to its higher social development and partly to its favourable environmental and hygienic condition' (p. 895). Development of social services such as education, health and transport through public policy measures was designated as social development. But he underplayed the role of economic factors because the state of West Bengal had been better-off than the state of Kerala.

Jain (1988) in an attempt to determine factors responsible for the observed regional variations in infant mortality levels in India, demonstrated the importance of maternal education and poverty level in explaining regional differences. In his study these two indicators explained about 60 percent of the regional variation in rural India. The results of his analysis confirm the importance of social development in terms of health services and education, but they also demonstrate the importance of economic factors. The index of poverty has been shown to have an independent effect on infant mortality, presumably because of an increase in neonatal mortality associated with the poor nutrition of mothers during pregnancy. This result simply implies that the level of infant mortality in Kerala would be even lower than its current level, if its economic situation were as good as that of West Bengal. On the other hand, if West Bengal was as poor as Kerala, its infant mortality would be even higher than its current levels (Jain, 1988: 155).

A few studies focus on the causes for infant deaths. In the Khanna study by Wyon and Gordon (1971), it was found that neonatal deaths were mainly due to birth-associated difficulties, and diseases, such as tetanus. Post-neonatal deaths were due to diarrhoea, pneumonia, measles, typhoid and tuberculosis. Ramabhadran and Lal (1972) reported that broncho-pneumonia and pneumonia were the most important causes of infant deaths in 1969 in rural India. Sundar Rao (1972) observed prematurity and congenital malformation as the major causes for neonatal mortality in Madras City. In a study conducted in Uttar Pradesh by Simmons *et al.* (1978) identified tetanus as the most important cause of infant death: it was caused by cutting the umbilical cord with unsterilised instruments, non-utilisation of health facilities, extremely backward socio-economic status, poor health of the mother, poor environmental sanitation and early age at conception. In his study based on Bombay and Poona data, Jain (1974) reported that the major cause of mortality falls under the category of diseases in the infective and parasitic group, respiratory diseases, and tetanus. The Registrar General of India (1983) in the Infant and Child Mortality Survey found that, in the rural areas, the major cause of death was tetanus which accounted for 14 percent of total infant deaths. The second major cause was prematurity.

In a detailed study based on hospital records Gandotra and Das (1982) found that in Baroda City during 1976, more than 60 percent of the neo-natal deaths were due to infective and parasitic diseases such as neonatal tetanus and proteus septicaemia. The incidence of such diseases was found to be much higher among female babies (36%) than among males (18%). Infective and parasitic diseases such as acute infantile gastroenteritis, pleurisy, diphtheria, and whooping cough were found to be the major killers of children in the age group 1-11 months. Acute infantile gastroenteritis accounted for about 38 percent of total post-neonatal deaths, and it was mainly due to unprotected water supply and food for the newborn.

In India child mortality was found to be lower in urban areas than rural areas because of differences in the standard of living and access to public health facilities (Visaria, 1985: 1399). Dutta and Kapur (1982: 222) and Visaria (1985: 1399) attributed urban-rural infant mortality differences to differing health-related practices. Visaria (1985: 1399) emphasised the type and place of delivery and the practices followed in the care of newborn infants as the components of place of residence associated with infant mortality. Visaria argued that the availability and practice of health-related factors were closely associated with rural-urban infant and child mortality differentials. Nag (1990: 358-359) attributed mortality decline in Kerala to factors such as commitment to health as a social goal, equitable distribution of health and other welfare services, land tenure reforms, and widespread public participation in decision making. However, Reddy (1989:2) argued that the provision of health services, though necessary, is not a sufficient condition for the improvement in the health status of people as its use is influenced by cultural, social and behavioural factors.

There are a few studies on the influence of environmental factors on infant and child mortality. The Infant and Child Mortality Survey conducted by the Registrar General of India (1983) reported that for 1978, the infant mortality rate in villages with no medical facility was 141, while it was 117 for villages with medical facilities. It also indicated that the infant mortality rate was 112 in villages where the source of drinking water was through taps, 121 in villages where the source of drinking water was through hand pumps, 143 where the source was wells, and 115 where it was ponds, rivers or tanks.

1.5 Gaps in research

The review of the literature shows that while there is consistency in the relationship of some demographic, socio-economic variables with infant mortality differentials, there is wide variation in explanations for differences because the populations under study differ. Although a number of studies of infant mortality have been carried out in India, the determinants of infant survival are still poorly understood. Not many studies in India have undertaken a multivariate analysis of the factors influencing infant mortality (Jain and Visaria, 1988). Many authors simply present the results of bivariate analysis. The statistical significance of the observed effect of a factor on infant mortality is not tested by all authors. Hence, the previous research on infant mortality in India is limited in scope because it does not identify the net effects of the independent variables on infant mortality. Many studies for example, establish the strong negative correlation between maternal education and infant mortality, but little work has been done to assess the effect of maternal education on infant survival after controlling for other explanatory variables. Conflicting results have been obtained in the studies which have tried to explore this relationship. Also, little attention has been paid to environmental and infrastructural variables of infant and child mortality.

There is little known in the context of India about how various socio-economic, demographic, and environmental factors operate in influencing infant mortality because studies on infant mortality in India using a conceptual framework are lacking (Khan, 1993). A few studies (see, Jain and Visaria, 1988) forwarded and used modified versions of Mosley and Chen's (1984) framework for studying infant mortality. The development and improvement of policies and intervention programs that seek to reduce infant mortality requires an understanding of mechanisms through which socio-economic factors operate. Mosley and Chen (1984) suggested that the variables mediating the effects of socio-economic factors on child health and mortality are the most amenable to policy intervention. Use of a conceptual model helps in understanding the proximate variables which influence infant and child mortality in a given social setting. This study will try to fill this gap in knowledge.

It has been argued that the relative importance of socio-economic and demographic factors on infant mortality varies with the level of socio-economic development of the nation. Kim (1988) observed that in a traditional society demographic factors affect infant mortality more than the socio-economic factors. This thesis will explore this hypothesis with a view to contributing to a better understanding of the relative importance of socio-economic and demographic factors on infant mortality. Mewat provides an ideal situation for exploring this hypothesis because Mewati society is a traditional and less developed area of India.

Mewat region was chosen for the present study because of the relative scarcity of previous research dealing with infant mortality in this region. Research on infant survival is scarce for Haryana State in general and Mewat region in particular. Mewat presents an excellent opportunity for studying mortality conditions in a poor region of India. The Government of Haryana State has declared this region a "backward region". It is one of the least developed parts of India and has little information on mortality and general health conditions. The Meo is the ethnic group for which demographic data are particularly lacking. Therefore, this study will add substantially to the rather limited pool of information on the correlates and determinants of infant mortality in Mewat and will also provide needed demographic data on a minority ethnic group of India.

1.6 Objectives

The specific objectives of this study are:

1. To examine the effect of demographic, maternal health and cultural factors on infant mortality.
2. To analyse the effect of socio-economic factors on infant mortality.
3. To investigate the effect of household environmental factors on infant mortality.
4. To identify the relative importance of demographic and socio-economic factors affecting infant mortality.

5. To explore whether the effects of the selected socio-economic variables on infant mortality are mediated through some of maternal factors (as suggested by Mosley and Chen, 1984).
6. To establish differential patterns of infant mortality for Meo and non-Meo groups and to identify some of the factors that could contribute to the observed patterns.

1.7 Approach to the problem

1. A fairly detailed, structured household interview schedule was used to achieve the objectives.
2. In addition, the following instruments were used: a study of the views of the mothers from both communities (Meo and Non-Meo) served by the *Anganwadi* on the *Anganwadi* activities and the extent of their participation in them; a study of perception of the *Anganwadi Workers* of community participation; in-depth interviews with key functionaries such as the Child Development Project Officer (CDPO), the heads of the *Panchayats* (local self government at the village level), and school teachers posted in Mewat; and collection of information on the coverage of population and utilisation of services by examination of the records available at the CDPO office.

1.8 Conceptual framework

The literature review in this chapter suggests that infant and child mortality is affected by many different and interrelated demographic, socio-economic, environmental and health factors. Any analysis of infant and child mortality which 'considers these factors singly is inevitably an oversimplification of reality' (Figa-Talamanca, 1984: 131). In order to understand the effects of various factors and the way they operate to influence infant mortality, it is important to have a conceptual framework that identifies the causal links between different factors in infant and child mortality. A framework also assists in the understanding of factors that may cause a change in the mortality level in a given society.

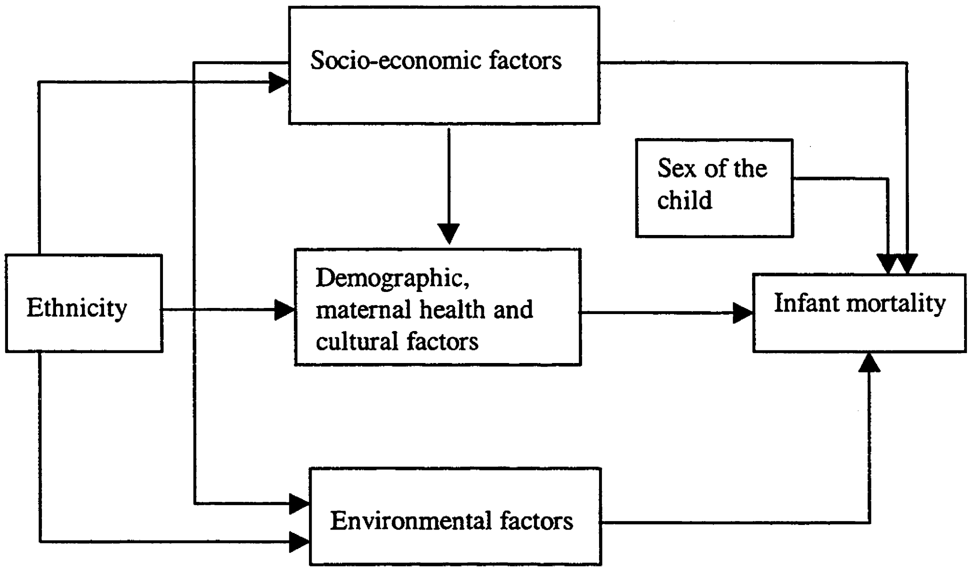
Several attempts have been made to develop theoretical frameworks that link various factors to child health and mortality (Mosley and Chen, 1984; Schultz, 1984;

Mahadevan, 1986; Venkatacharya, 1985; Norren and Vianen, 1986; Cornia, Jolly and Steward, 1987: 35-41; Jain, 1988; Nag, 1988; Talwar, 1988; Berman, Kendall and Bhacharyya, 1994; Millard, 1994). Among the various theoretical frameworks for the determinants of infant and child mortality, the most comprehensive and systematic is the one developed by Mosley and Chen (1984).

The most distinctive aspect of the Mosley and Chen framework is the 'identification of a set of proximate determinants, or intermediate variables, that directly influence the risk of morbidity and mortality' (Mosley and Chen, 1984: 27). The fifteen proximate determinants of infant and child mortality can be grouped into five broader categories related to: (1) maternal factors (age, parity, birth interval); (2) environmental contamination (air; food/ water/ fingers; skin/ soil; and vectors); (3) nutrient deficiency (calories, proteins, vitamins, and minerals); (4) injuries (accidents, intentional injury); and (5) personal disease control (personal preventive measures and medical treatment). The model suggests that all proximate determinants in the first four categories will directly influence the rate of shift of healthy individuals towards sickness. The socio-economic determinants have direct effects on these proximate determinants, thus indirectly influencing infant and child mortality.

Mosley and Chen's (1984) model is adopted for the analysis of factors affecting infant survival in this study because it incorporates both social and medical science methodologies into a coherent analytical framework and provides a convenient and practical guide for studying infant survival. Furthermore, it is flexible so that it can be modified to suit any situation. Though many variables are not included in this study, reference will be made to other components of Mosley and Chen's framework wherever necessary and appropriate. Some variables not included by Mosley and Chen are also included. In such cases, inferences will be made to the ways in which these variables affect infant mortality where appropriate. The operational framework for this study is shown in Figure 1.1. The assumed directions of the relationships between the determinants of infant mortality are shown in Figure 1.1 by the arrows that connect the boxes. The effect of socioeconomic factors is mediated through demographic, maternal health, cultural and environmental factors: some of the proximate determinants in Mosley and Chen's (1984) model. Sex of the child is considered in the framework as control variable and it controls for biological effect. The effect of ethnicity on infant mortality will be transmitted through socio-economic, environmental and demographic, maternal health and cultural factors.

Figure 1.1 An operational framework for studying infant mortality



Source: Mosley and Chen (1984)

1.9 Organisation of the study

This study is organised into eight chapters. Chapter One introduces the topic, provides a review of literature, gaps in research, objectives of the study, approach to the problem and conceptual framework. Chapter Two presents a review of secondary data sources on infant and child survival in India and the need for collecting primary data, design of the survey, evaluation of the quality of data, field experience, and method of analysis. Chapter Three provides background information on Mewat, the historical significance of the Meo community and the features of Meo society which will help in the interpretation of results. In addition Chapter Three describes the characteristics of the survey population. The effect of demographic, maternal health and cultural factors on infant mortality are examined and discussed in Chapter Four. The effects of socio-economic factors and household environmental factors on infant mortality are analysed in

Chapter Five and Chapter Six respectively. Chapter Seven deals with infant mortality differentials among Meos and Non-Meos and factors contributing to those differentials. Chapter Eight concludes the study by summarising the main findings and making policy recommendations.

CHAPTER TWO

DATA AND METHODOLOGY

2.1 Introduction

The aim of this chapter is to provide details of data sources used and the methodology used for analysing the data for the present thesis. The chapter first discusses the nature of data that are available from secondary sources and the extent of their utility. It then brings out the need for collecting primary data, and provides details about the study area for this thesis, the reasons for choosing the study area, the sampling procedure, and methods used for data collection in the 1996 Mewat survey. Data quality, field experiences and, finally the methods of analysis of data are also discussed.

2.2 Review of secondary data sources in India

Data for mortality research are essential for medical, public-health, demographic and other reasons, but their lack of availability is a major problem. In India, lack of reliable data make it difficult to approach the problem of mortality with any certainty.

2.2.1 Civil registration system

Although the civil registration system in India has existed since 1866, the vital rates based on it continue to be grossly deficient. Until about 1950, the registration system covered only about two-thirds of the geographical area and three-fifths of the census population (Chandrasekhar, 1954). There was no uniform legislation relating to compulsory registration of births and deaths on an all-India level until 1969 —a factor which hampered improvement of the registration statistics. The Registration of Births and Deaths Act, passed in 1969, extends to the whole of India, and makes the registration of births, stillbirths and deaths compulsory. Failure to register such an event is punishable under the Act (United Nations, 1969).

Although any failure to register births and deaths is punishable by law, the coverage of vital events in India is far from satisfactory. Because of under-reporting, the rates derived from registered vital events present a very distorted picture. One major constraint on information on the Infant Mortality Rate in India is the lack of uniformity and reliability in the system of recording vital events. Even though the registration of births and deaths is technically compulsory it is not enforced, even in cities. The implementation of the national Act providing for compulsory registration of births and deaths continues to be difficult because of mass illiteracy, ignorance, and the scattered nature of the rural population. Administrative and supervisory control over the reporting and registration machinery is also lax (Jain, 1982: 135).

At present, births and deaths are registered by the village *chowkidar* (watchman) who is an official of the revenue department. He may not recognise the importance of recording births and deaths and is frequently not committed to this job. Correct recording is not ensured because the village *chowkidar* may be illiterate. Moreover, he may have other duties to perform which results in large scale omissions in birth and death registration. In fact, the importance of the registration of vital events is realised neither by the local registering authorities nor by the masses. For most Indian people, few occasions arise when birth and death certificates are required. It is, therefore, not surprising that they do not appreciate the necessity of registering vital events.

From the civil registration reports, the infant mortality rates with rural-urban breakdown are available at district level. All other data are presented only at the state level. These include data on the number of births and deaths, birth rates, death rates, the age distribution of the deceased, and causes of death. The Civil Registration System, however, does not provide information on socio-economic differentials in infant and child mortality.

2.2.2 National Sample Survey

Another source of information on infant and child mortality is the National Sample Survey (NSS), which has been conducted in the form of annual surveys since 1950. Information on births, deaths and infant mortality rates has been collected in several rounds in the past. However, the accuracy of these statistics has been handicapped by the difficulty encountered by respondents in recalling all events during the reference period. This recall-lapse appears to be more serious in respect of deaths than births (Das and Bhattacharya, 1977). Moreover, the results are published only at state level with rural and urban bifurcations.

2.2.3 Sample Registration Scheme (SRS)

In the absence of dependable vital rates from civil registration, the Office of the Registrar General, India initiated the sample registration of births and deaths in India, popularly known as the Sample Registration System (SRS), in 1964-65 on a pilot basis and as a full-scale system from 1969-70 (Registrar General of India, 1993). This is a demographic sample survey based on a dual record system. The main objective of the SRS is to provide reliable estimates of birth and death rates at the state and national levels for rural and urban areas separately. It also provides various other measures of fertility and mortality.

The dual record system under the SRS consists of continuous enumeration of births and deaths in a sample of villages and urban blocks by a resident part-time supervisor. The data obtained through these two sources are matched. The unmatched and partly matched events are reverified in the field to give an accurate count of correct events without duplication. This methodology provides a cross-check on the correctness and completeness of events of births and deaths listed in both the records.

The information on infant and child mortality given by the SRS is limited in scope as the published data relate only to the infant and child mortality rates for rural and urban areas at the state level for certain selected years. Certain data are also available giving the breakdown of child mortality by age. Unfortunately, because of the smallness of the sample size, the vital rates are not published by SRS below the state level.

2.2.4 Survey of Infant and Childhood Mortality, 1979 and 1984

The data generated by the SRS do not provide mortality differentials by various socio-economic variates. A special survey on infant and child mortality was undertaken by the Office of the Registrar General of India not only to provide estimates of infant and child mortality, but also to study the patterns and differentials of mortality for various socio-economic levels (Registrar General, 1983). The survey was conducted in 1979 in about 3700 units of the Sample Registration System (SRS) along with the regular SRS half-yearly survey. The survey was repeated in 1984. But here also the findings were published only at the state level.

2.2.5 Birth register

Another source of information is the birth register which is maintained at the Primary Health Centre (PHC)[1] and subcentre level by the Auxiliary Nurse Midwife (ANM) or Female Health Worker. This register contains information on the date of birth, parity of mother, age of mother, and sex of the newborn, but does not have any details regarding the socio-economic status of the household.

2.2.6 National Family Health Survey (NFHS), 1992-93

The NFHS is a nationally representative sample survey, which was conducted in 25 states that include more than 99 percent of India's population. The NFHS project was initiated by the Ministry of Health and Family Welfare and co-ordinated by the International Institute of Population Sciences in Bombay. Overall, 30 organisations were involved in the survey, including 18 Population Research Centres and 7 private-sector research companies. Macro International and the East-West Center provided technical

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[1] In India a Primary Health Centre (PHC) covers a population of about 100,000. It has a medical officer and two other qualified doctors, one of them generally being a female. As the number of villages under each PHC is quite large, sometimes 100 or more, each PHC is divided into 10 or more subcentres, covering a population of nearly 10, 000 and spreading over an area of roughly 10 villages.

assistance for the NFHS, which was funded by the US Agency for International Development.

The NFHS provides national-level and state-level data on the demographic and socio-economic determinants of infant and child mortality besides providing data on other demographic parameters such as fertility, marriage patterns, family size preferences, the level of unwanted fertility, knowledge and practice of family planning, the political demand for contraception, use of antenatal care services, breastfeeding and food-supplementation practices, child health and nutrition. The NFHS is specifically designed to provide a source of demographic data for inter-state comparisons, and to this end the survey used uniform questionnaires and uniform methods of sampling, data collection and analysis for all the states. Information from the survey is intended to assist policymakers, administrators and researchers to assess and evaluate population and family welfare programs and strategies in individual states and the country as a whole (International Institute for Population Sciences 1995b).

2.3 Need for collecting primary data

In India the relevant surveys that have been conducted have mainly collected quantitative data that established the levels and trends of infant and child mortality, but these were not geared towards explaining those levels and trends. The survey data sets provide little indication of the cultural factors which could help explain the levels of differential mortality. The major thrust of the present study is to explore the differentials and determinants of infant mortality at the micro level in Mewat region of Haryana State, India. In order to identify the patterns of differentials by social, cultural and environmental conditions, to highlight the determinants of those differentials it would be necessary to have detailed data which would cross-classify infant survival by social, cultural and environmental background characteristics of the households.

None of the sources discussed above give detailed information on infant and child survival and its socio-economic, demographic and environmental correlates. Even if they give detailed information on such correlates (such as the infant and child mortality survey), the vital rates are not published below the state level. The recently conducted

NFHS data could not be used because they do not provide information on Mewat region and its people. Hence, primary data were obtained by conducting a field survey in Mewat region.

2.4 Research methodology

Conventional large-scale, cross-sectional databases have been the source of major mortality studies. Most studies of child mortality are based on large-scale surveys, such as the World Fertility Survey (Mott, 1982; Somoza, 1980), or on vital registration statistics (Knodel and Chamratrithirong, 1978; Hongladarom 1979). Obtaining accurate data, however, is very difficult. Respondents may be reluctant to talk about children who have died, resulting in under-reporting such that the incidence of child mortality appears lower than it actually is. This is a problem in both large- and small-scale studies, although it is probably easier to recognise the extent to which this happens and to correct for it in small-scale and longitudinal studies (Prazak and Booth, 1995).

Where survey research sometimes has difficulty in obtaining valid data (e.g., Brass and Jolly, 1993: 30-31), micro-demographic approaches have been used to explore what is happening at the grassroots level. McNicoll (1988: 10) states:

> For a number of years, many would agree, survey research on demographic behaviour has been experiencing diminishing returns...The micro-approaches to demographic research that are the subject of this volume promise ways out of the impasse. The survey-generated demographic accounting system is retained, but the crude correlates of demographic change can now be refined to reveal the inner logic of survey-based relationships; the ambivalences suppressed in multiple-choice responses can be explored. A new, deeper empirical understanding of population change is attained.

Khan (1993) also suggests that while the number of cross-sectional studies on infant mortality in India is increasing, it is highly desirable that micro-level studies should be initiated simultaneously. Considering the time and resources available, a study of a small area rather than of the whole country was thought to be appropriate.

2.4.1 Choice of methodology

Combining both quantitative and qualitative methods is ideal for this type of micro-demographic approach. The quantitative approach through its standard structured questionnaires provides information that is internationally comparable but culturally insensitive to the issues being investigated, thereby paying little attention to validity and interpretation of data (Rwabushaija, 1991: 168). It follows that the quantitative approach is inadequate for full investigation, explanation and understanding of the issue under investigation because it ignores traditional socio-cultural practices that influence social phenomena. Meekers (1990: iv-v) argued that:

> Demographic and other statistical studies generally emphasise comparability and focus on national populations, while ethnographic studies deal with populations of a much smaller scale. Consequently, statistical data sources do not have the same level of detail as ethnographic studies. Both perspectives have their advantages and disadvantages, and it would be helpful to integrate both perspectives...

Quantitative and qualitative data each have a perspective to offer on the study of infant mortality. Therefore, the two together offer more than either on its own. According to Morse and Field (1995:3):

> ...it is important to remember that both qualitative and quantitative methods are merely tools for solving research problems. It is the researcher's responsibility to be wise enough to recognise when appropriate qualitative or quantitative methods should be used and smart enough to do them. Such versatility is the hallmark of a good researcher. From the perspective of considering research methods as tools, the qualitative-quantitative debate becomes an insignificant argument.

In this study I adopted both qualitative and quantitative approaches to data collection to find the best way of gathering information. The use of both quantitative and qualitative methods in studying infant mortality has been recommended by Khan (1993: 4):

> The social dynamics and processes through which the suggested proximate variables are influenced can be better understood by undertaking micro-level case studies using anthropological approaches rather than conducting large-scale cross-sectional surveys. Perhaps an integration of both the approaches will yield much better and comprehensive knowledge than either of the two approaches in isolation.

The combination of the two approaches enabled two important contributions to be made. First, the analysis of the Mewat Survey gives an understanding of the relationship between dependent and independent variables, thus establishing the overall patterns and correlates of infant mortality. Second, the qualitative study provides a clear insight into the social dynamics and the processes through which these independent variables themselves are influenced. For example, while quantitative data establish the link between maternal age at birth and infant mortality, qualitative data explore why in Mewat a proportion of women give birth below age 20 or why women get married so early and begin childbearing at an early age. Similarly, while quantitative analysis establishes a relationship between place of birth and infant mortality, qualitative data explore why in Mewat women prefer home to hospital for giving birth. The role of qualitative data in this study was to provide not statistically generalisable information, but rather information that could expose the attitudes, opinions and belief patterns underlying factors affecting infant mortality.

2.5 Data sources

Most of the primary data for this thesis are derived from fieldwork undertaken in 1996 in six villages of Mewat region of Haryana State, India. The fieldwork consisted of two distinct components: quantitative and qualitative. The quantitative survey consisted of a structured questionnaire and this data set is referred to as the 1996 Mewat survey or Mewat field data. The qualitative component comprised in-depth interviews with key functionaries, informal interviews with a subset of respondents who participated in the quantitative survey, and participant observation. The fieldwork undertaken in Mewat spread over a period of eleven months from April 1996 to February 1997. The first two months of fieldwork were spent in getting permission for the survey, organising the logistics of the survey and pilot-testing the study instruments. Details of the study design of both data sets are described below.

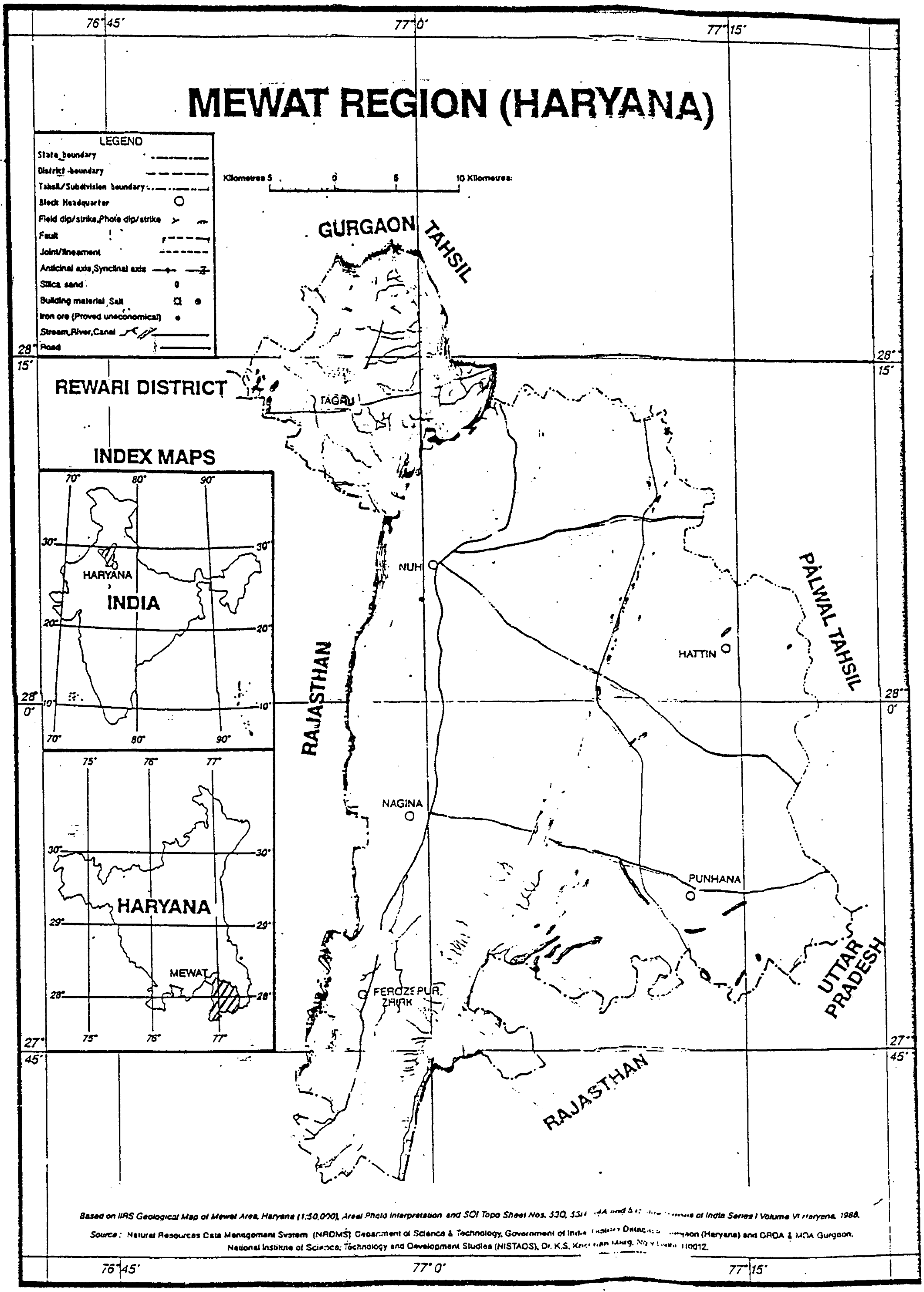
2.5.1 Selection of the study area and sampling procedure

Mewat region, the area for this research, was purposely chosen to focus on a population living in a poor region of India. This is one of the underprivileged regions with little or no information on basic demographic and health indicators. The Government of Haryana State has declared this a 'backward region'. The state of its backwardness is discussed in Chapter Three. Mewat region of Gurgaon district of Haryana State was chosen for this study because a large part of Mewat region lies in this district. In the Mewat region of Gurgaon district, a large number of villages have more than 50 percent Meo population: the traditional inhabitants of Mewat (Amir-Ali, 1970).

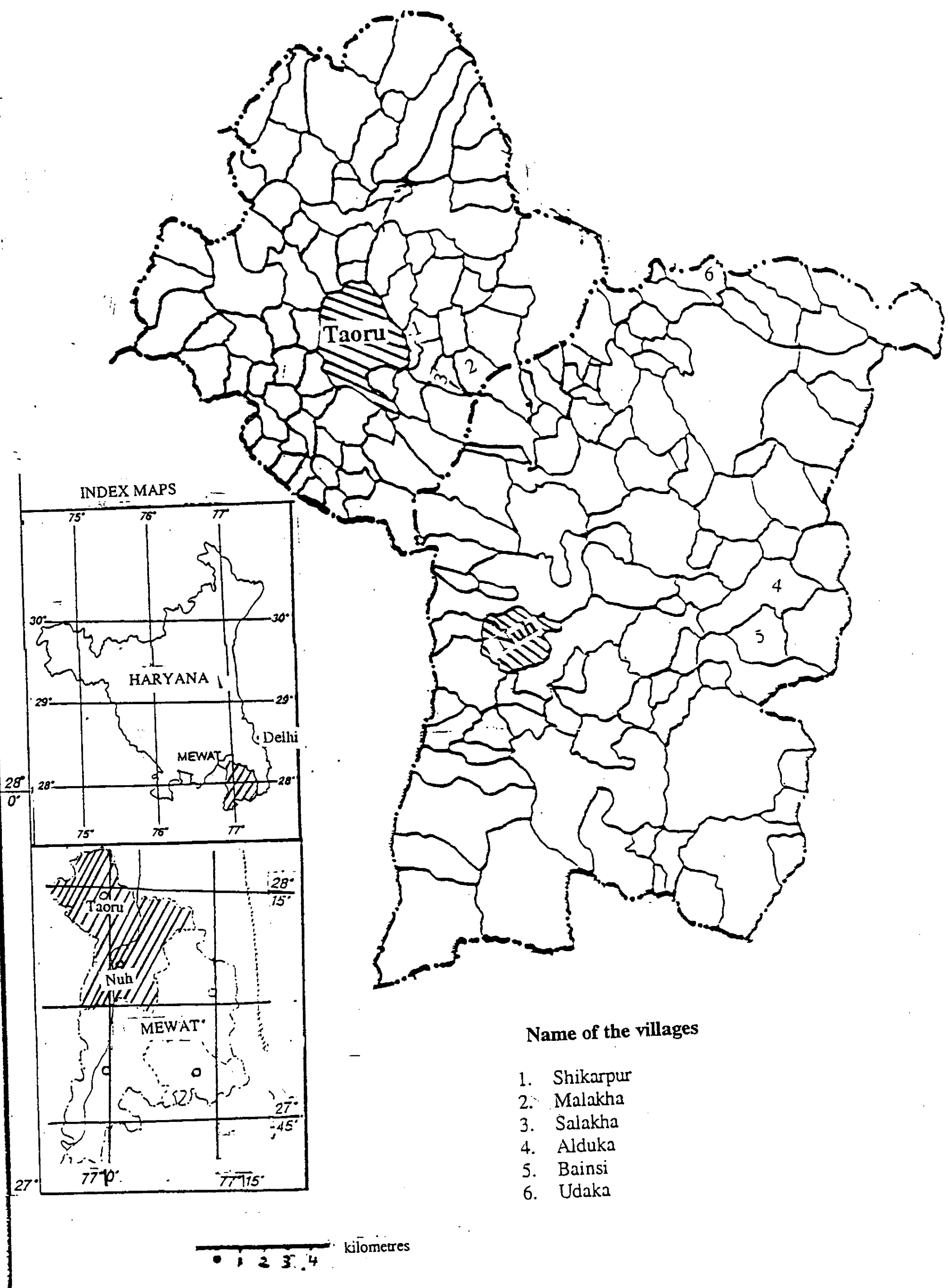
A secondary factor in the selection of Mewat region as my study site was my long association (from 1984 onward) with this region as a lecturer in population geography at the Government Post Graduate College in Gurgaon. I also conducted one large-scale survey in 1987 in the same area when I was a research scholar at Jawaharlal Nehru University, New Delhi. I taught a course on field survey methods and for that, along with my students, I twice visited two villages of Mewat to carry out a socio-economic survey of the households. Given the immense local differences in India, this prior knowledge was a big advantage. Hence, my familiarity with the area served as a convenient grounding for carrying out the survey for my thesis.

Two blocks of Mewat region were selected purposively with a view to their suitability for conducting the survey within the time span of eleven months. These two, Nuh and Taoru, form part of Nuh Tehsil which has the second highest Meo population in Mewat. Initially the survey was intended to be undertaken in Ferozpur Jirka Tehsil which has the highest concentration of Meo population, but this area was heavily flooded during the time of the survey and after the floods receded it was badly hit by dengue fever. Because of the inaccessibility of that area I decided to conduct the survey in Nuh Tehsil which has a substantial proportion of Non-Meo population as well. If the survey had been in Ferozpur Jhirka Tehsil, it would have been a community-based study, but Nuh Tehsil allows exploration of whether ethnicity has some influence on infant mortality.

The two selected blocks are near Gurgaon district which is my home town and the field research station for this study, from which they were easily accessible. This criterion was set because investigating teams needed to reach study households at sunrise and to return home after dark. After the selection of the blocks, the sample villages were


MEWAT REGION (HARYANA)
LEGEND
State boundary
District boundary
Tahsil/Subdivision boundary
Block Headquarter
Field dip/strike, Photo dip/strike
Fault
Joint/lineament
Anticlinal axis, Synclinal axis
Silica sand
Building material, Salt
Iron ore (Proved uneconomical)
Stream, River, Canal
Road
Kilometres 5 0 5 10 Kilometres
GURGAON TAHSIL
REWARI DISTRICT
TAORU
INDEX MAPS
INDIA
HARYANA
MEWAT
NUH
HATTIN
PALWAL TAHSIL
RAJASTHAN
NAGINA
PUNHANA
FEROZEPUR ZHIRK
UTTAR PRADESH
RAJASTHAN
76°45'
77°0'
77°15'
28°15'
28°0'
27°45'

LOCATION OF STUDY VILLAGES IN TAORU AND NUH BLOCKS



chosen, then, sample households were chosen. Using the latest available information, the 1991 Census, villages with 500-3000 population in 1991 were included in the sample. This was done to eliminate villages that were too small or too large. Large villages were eliminated from the sample because they would have monopolised the sample,[2] and, thereby, provided a narrow range of villages. Smaller villages were eliminated from the sample because of the problem of return on survey investment, since a good deal of time would be spent in a sample village before any interviews would be conducted. However, to make sure that the elimination of smaller villages would not restrict the sample too greatly, a minimum population of 500 was set. Three sample villages from each block were chosen from the eligible villages using a random number table from Blalock (1981: 598-601).

A census of households in each sample village was taken, and this information was used as the basis for selection of households. A household was considered eligible for the sample if it had experienced a live birth three years preceding the survey (*Holi* festival 1993 - *Holi* festival 1996). A reference to Holi, an important festival in India, was expected to facilitate recall and thus, reporting of births and deaths. Children born during this period formed the universe of the study. Of 950 children thus identified, 83 had died during infancy and the remaining 867 had either survived beyond their first birthday or were censored by the survey date. In the survey, a mother who had a live birth during the reference period was considered as a respondent. If there were more than one woman in the household who had a live birth during the reference period, all were selected for the survey.

A list of eligible households was also prepared from the *Anganwadi Workers'* registers, and village *chowkidars*' registers, and by asking the *dais* (traditional birth attendants) of the villages concerned. This helped in cross-checking the eligible households identified on the basis of the baseline survey. On the basis of the census of the villages, detailed lists of target populations were prepared. The list included the

[2] Because all eligible households in sample villages were interviewed and because the sample was relatively small (approximately 400 households).

name, address, age, and number of children of the head of the household. The houses were divided according to *mohallah* or *pannas* such as *mohallah bhitarla* (inner locality) or *mohallah bahaerla* or *parla* (outside locality) or *mohallah bichala* (middle locality). This helped in identifying where the houses were. The sample is described in Table 2.1.

The sample was limited to births in the three years preceding the survey for two purposes. First, this reduced recall error. Second, excluding births of more than three years preceding the survey kept the interval between past infant mortality and current information relatively small. This was important since there is an inherent assumption in any study which explains past behaviour (e.g. child death in the past) by contemporary information (e.g. landholding), that the contemporary information is a good approximation of the facts as they were when the relevant event occurred. While this assumption is reasonably good for short intervals between current information and past decisions, it becomes progressively worse, the larger the interval (Anker, 1973: 91).

Table 2.1 sample profile

Name of village	Shikarpur	Malakha	Salakha	Alduka	Bainsi	Udaka	Total
Total population[a]	1641	793	618	2740	2087	1059	8938
Total number of households[a]	189	126	84	361	270	146	1176
Total households surveyed	67	46	34	119	87	54	407
Total respondents	73	52	38	129	98	57	447
Total births 1993-94	53	27	21	81	70	39	291
Total births 1994-95	56	29	25	86	77	42	315
Total births 1995-96	68	37	24	94	84	37	344
Total births 1993-96	177	93	70	261	231	118	950
Total infant deaths 1993-96	16	10	8	20	18	11	83

Source: Mewat field data, 1996

[a] Government of Haryana (1993).

For information on the views of the mothers about Integrated Child Development Services a sub-sample of 82 households (every fifth household) was selected in each block and a structured interview schedule was used for data collection. A separate schedule was designed for the *Anganwadi Workers* to assess community participation in the program.

2.5.2 Description of the interview schedule

Three sets of schedules were administered in the field: the village schedule, the household schedule and the *Anganwadi Workers'* schedule. The village and household questionnaires were mainly drawn with some modifications from the National Family and Health Survey, 1993 (IIPS, 1995a). A copy of the village and household schedules is given in Appendix C.

2.5.2.1 Village schedule

Village schedule mainly covered the availability of medical and other infrastructure facilities such as education, transport, post and communication. The information on the village schedule was obtained from the *sarpanch* (village headman) who also gave an overview and provided names of other persons who could provide more specific information. For example, schoolteachers were contacted to ask about the availability of schooling and educational facilities, and health practitioners were asked about health facilities available in the village. The village questionnaire was filled in during the fieldwork in each village based upon the responses from these informants.

2.5.2.2 Household schedule

Household schedule consisted of two parts. The first part asked about the demographic, socio-cultural and economic background of the household and personal and environmental hygiene of the family. Questions were asked first to identify the household and its demographic and social background: ethnicity, education and occupation, religion, and caste. The middle section consisted of questions on birth histories of all live births. This section was followed by questions on type of delivery care and breastfeeding practices.

The second part contained questions to obtain the views of the community about ICDS services; this part was subdivided into two, the first dealing with ICDS services for women and the second with services for children. Both parts also contained questions about access to and use of other services. Although the data collected in this section were not used extensively in this study[3], in some circumstances they supplemented the main data. They also helped in interpreting the results of the main data set, particularly the differential use of health facilities by Meos and Non-Meos.

2.5.2.3 Anganwadi Workers' schedule

Again, the data generated through this questionnaire are not used much in this study but helped me to understand the providers' perspective. This complemented the information on the clients' perspective which was obtained in the second part of the household questionnaire. It also gave a wider understanding of the health behaviour of the people of Mewat. All the *Anganwadi Workers* of ICDS villages covered under the survey were interviewed using a separate questionnaire. Information were collected on their social and educational background; training program; relationship with other functionaries; knowledge regarding health education, immunisation, diagnosis and treatment of minor ailments; the infrastructure facilities available at the *Anganwadi* (the place where the ICDS services are offered); time spent on various ICDS programs; community participation; and knowledge about ICDS programs.

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[3] The focus of the study changed after the field survey and it was felt that it would be better if I concentrate on infant mortality rather than trying to integrate infant mortality and impact of ICDS on infant mortality which was previously thought.

2.5.3 Qualitative data

The qualitative data considered of participant observation, informal interviews with a subset of respondents who participated in the quantitative survey, and in-depth interviews with key functionaries. Even though it was initially thought that the questionnaire data would be used mainly to validate or refute patterns that emerged in the 1996 Mewat Survey, it turned out that the qualitative data unearthed issues not envisaged when planning the survey.

A good deal of data were recorded on the basis of participant observation. There were a few places in the village where everything of importance was discussed: for example, the village well. Women go there twice a day to draw water and discuss there everything of importance. In order to keep abreast of village life, I tried to visit these places every day or every other day in a systematic way. These visits were quite informal, and I could learn what was going on in the village and ask questions when something was not clear to me. However, I could not take down notes because women stopped talking as soon as I took out my notebook. After participating in those sessions, I used to go to a field or some other quiet place and write down all I could recall. However, in individual interviews people did not seem to mind if I took notes there and then.

To get men's perspectives on various aspects of village life, I used to visit *chay dabas* (tea shops) whenever my husband was with me in the field. My husband's presence was very helpful in establishing rapport with the village men at these tea shops. These *dabas* were frequented by men who discussed from politics to marriage and childbirth; it was there that I heard of people dying from dengue fever. I also participated in many village functions such as birth ceremonies.

Anganwadi centres were visited to observe the presence of children, various activities conducted by the *Anganwadi Workers* for pre-school education, and the general hygiene conditions of the place. The workers were observed performing various functions such as weighing children, preparing food and distributing food to children. I would make notes of my observations at the *Anganwadi* and I would also clarify certain issues with the *AWW*.

Informal interviews were conducted with women who had a child death during the reference period in order to share their thoughts and feelings; with mothers whose children survived; and with the village *dais* to obtain general views, beliefs, attitudes, and awareness regarding childbirth, breastfeeding, the availability of different services and the opinion of mothers regarding use or non-use of ICDS services. Only one woman from any household was chosen for informal interview even if there were two or more eligible women in the household, because it was felt that the large amount of time required to interview more than one woman in the extended family caused too great an imposition on the household concerned. Although this biased the qualitative sample in favour of nuclear families, this bias was not very important because family type proved to be a relatively unimportant predictor of infant mortality (See Chapters Six and Seven).

In-depth interviews with various social welfare and health department functionaries were conducted to examine the use of different services by Meos and Non-Meos, and the effectiveness with which ICDS activities at various levels are co-ordinated. The Child Development Project Officer of the selected blocks were also interviewed without any structured form. However, guidelines were provided so that the interview covered all the aspects of the program relevant to the study. The in-depth interview guidelines were prepared before the fieldwork started and were modified after testing in the field. The question guides were intended to verify quantitative evidence as well as to supply information about the use of various ICDS services not available in the quantitative data used for this study.

To obtain detailed information on various matters and to verify some of it, I used two Meo women, village headmen and two local school teachers as key informants. They were selected for their knowledge, experience and involvement in village activities, and because they were affable and had time to spare. Most people objected to my recording interviews with them. They felt uneasy when the tape-recorder was turned on. The machine itself was quite a novelty for many villagers, and they were mystified by the idea; they also considered it dangerous and fabricated stories about its use. Despite my giving a written assurance that the interviews would be kept confidential, I realised that I was given wrong information when I tape-recorded talks. Moreover I realised that it was often a barrier to rapport. I noticed that whenever I turned on the tape-recorder, it seemed to create a distance between my respondents and myself. Therefore I relied on my field notes for my qualitative data.

2.5.4 Data collection

Before the commencement of the household data collection in June 1996, written permission was obtained from the Deputy Commissioner of Gurgaon district to carry out the survey.

2.5.4.1 Recruitment and training of interviewers and fieldwork

Three female research assistants-interviewers who had masters' degrees and had previous survey experience were recruited to assist in conducting the household and AWW survey. The two main criteria used for selecting them were the ability to speak the local language and previous field work experience. Two had long experience of data collection and translating material from Hindi to English and vice-versa. The third assistant also had experience and understanding of the nature of work as she had assisted me in past research conducted in this area. All three research assistants were fluent and familiar with English, Hindi and Haryanvi dialect.

A briefing and discussion session on the objectives and importance of the study as well as the Hindi translation of the questionnaire was held with the three research assistants. They were given an exhaustive three-day training before commencing pilot testing of the instruments. The training sessions consisted of instruction in interviewing techniques and field procedures for the survey, a detailed review of the contents of the questionnaire, quality control, instructions for filling out the questionnaires, ethics to be maintained, and clarification of concepts. The training sessions lasted until both the interviewers and I felt confident that we were in agreement on the meaning of the questions and the interviewing procedure.

At the beginning of the training they were thoroughly briefed on the nature and purpose of the survey. Each of them was given a copy of the questionnaire, and after each question had been explained separately, a brief practical session was held to familiarise them with the questions and the techniques to be used to fill in the questionnaire. An important part of the training was familiarising them with a calendar of the major events that had taken place in Mewat in order to assist respondents who did not remember or know the birth and death dates. Although this method did not give the exact dates of the vital events, it assisted in identifying, for example, the year and month in which a baby was born, or the month or year in which a child died. This training on using a calender of events to obtain age was essential because in Mewati families birth certificates are rarely available.

The research assistants were also trained in ways of establishing rapport and maintaining confidentiality and respect for informants. It was explained to them that establishing a rapport with the respondent was essential and patience was required if the respondent was interrupted to attend to a household matter. If any question was not clear to the respondent, the interviewer was required to repeat the question, and if necessary explain the question without prompting the respondent. The interviewers were also instructed to follow the recommended sequence of the questions when interviewing the respondent, and to ensure privacy to allow unrestricted discussion with the women. The presence of any other person might have hindered the free flow of discussion and led to the women giving false information on some issues.

A team consisting of the three research assistants and myself carried out the fieldwork for this study. Besides collecting data I was responsible for overall management of the team. Actual data collection commenced in June 1996 and was divided into six phases, with each phase consisting of one study village. Interviews were usually scheduled between 8 a.m and 7 p.m. The average interview time for the household questionnaire was about 35-40 minutes. Interviewers were instructed to submit completed questionnaires to me at the end of each day. Each interviewer was also instructed to make a maximum of three call-backs, if necessary, to complete the household questionnaire. In most cases the call-backs were attempted in the morning hours, usually between 8 and 9 a.m. The team met almost every day during lunch in the field, to share experiences, to solve problems and to enhance the morale of the field workers. From June until August, there was not much work in the fields, so women were readily available. October and November were quite busy months, so this period was used to conduct interviews with AWWs, health personnel, Child Development Project Officer and other functionaries. In all, 407 households were visited, and the response rate was around 99 percent. The response rate was high because close and extensive contact with sample villages enabled the interviewers to talk to many respondents who probably would not have been interviewed under the usual mass-survey conditions. My experience has been that the response rate and the quality of the responses directly correspond to the degree of rapport between researcher and respondents. In this case, the houses of prospective respondents were often visited two or three times before respondents were asked to be interviewed and I visited villages at virtually all hours of the day in order to contact respondents. Most of this extra effort was directed towards working women (non-working women were usually at home in the afternoon); and two incomplete schedules were those of working women. This method of interviewing reduced suspicion and increased rapport thereby, increased the accuracy of the data and improved the quality of information.

2.5.4.2 Pre-testing of household questionnaire

I pilot-tested the first draft of the schedule over a two-week period in thirty households in two villages of each block to evaluate the effectiveness of the survey instruments for eliciting correct information: how well different questions were understood by the respondents, how much time it took to complete each schedule, and the problems of administering them in the field. The pilot testing proved to be an extremely useful exercise. On the one hand it helped to clarify some of the issues relating to interviewing style and language use and, on the other hand, it indicated the need for some changes in the questionnaire.

Certain questions were deleted from the schedule and a few important questions were added. Of special importance in this regard is the deletion from the original schedule of questions on ever-use of contraception and abortion history. The major problem in this regard was the impression of the respondent that the investigators were trying to identify potential cases for sterilisation. Hence, there were strong resistance to providing information on contraceptive use. The problem was even greater for questions on abortion which the respondents felt was contrary to their religious beliefs. Because of these problems I decided to delete that particular section. A question on ever-use of ICDS services was included instead since women who used ICDS services are more likely to use contraception. The final schedule was used in the selected households from June 1996 to February 1997.

The pilot-testing was also helpful in deciding the timing for informal interviews with the women. The pilot-test showed that the completion of each household schedule took 35 to 40 minutes and the informal interviews took around 60 minutes or sometimes a little longer. Informal interviews lasted longer than the household schedule because the women were giving detailed explanations and additional information on some of the issues related with infant mortality. These informal interviews are the main source of qualitative data for this thesis. If informal interviews had been conducted immediately after the completion of the main questionnaire it would have required a large amount of time in one household and the respondents may have felt we were taking too much of their time. So women were asked about the most suitable time to return for an informal interview, and generally it would take place at a later date.

2.5.5 Data processing

Data from the field were not entered into the computer until the completion of the field survey. There were three separate steps at which editing occurred. In the first step, questionnaires were edited in the village by the investigators. Inconsistent answers led to an immediate revisit to the respondent. In the second step, I more thoroughly edited at the field research station. Again, inconsistent answers led to a revisit to the respondent, and these revisits no doubt improved the quality of the data. In the third step, a computer programmer again checked the questionnaires manually for consistency before they were considered complete for data entry purposes. This included checking the responses to the age questions and ensuring completion of birth details.

Data were not entered directly from the questionnaire. Rather a code plan was prepared after consulting the programmer and all information was transferred to a coding sheet; data were entered from this coding sheet by professional data entry personnel at the Centre for the Study of Regional Development, Jawaharlal Nehru University, New Delhi, using the software dBase 1V Plus. It took three weeks to enter all the data. A number of computer-based internal consistency checks were applied and errors were corrected by reviewing information on the questionnaire. This helped in cleaning the data and removing inconsistencies. All data entry and editing operations were completed by the end of February 1997.

2.5.6 Field problems

Major problems in the implementation of the survey were heavy floods and the spread of dengue fever in Mewat during the field survey in 1996. These prolonged the time I spent in the field. Since the area was beset with heavy flooding, roads leading to Mewat were severed and many places became inaccessible. Transport services were reduced. Many times research teams had to wait until late to get transport to the research station after finishing the day's job; this was not only time-consuming but tiresome too. Hence, additional measures had to be taken to ensure a reliable daily pick-up and drop facility for the research assistants from the research station[4]. A car was hired for this purpose. Many times I had to provide transport for local people because public transport was severely affected during that time.

Moreover, as mentioned before, there was a serious outbreak of dengue fever in Mewat and one of the research assistants was affected, so additional health measures such as regular health checks of all the team members were taken to ensure the proper health of the research team. These measures, while absolutely essential, added significantly to the cost of the study. Despite these measures, sustaining the morale of the research assistants was a challenging task. We started in the villages less affected by floods, but even in those villages people had relatives in the areas more affected by

[4] Two of the female assistants were not married, so were not allowed to stay away from their homes after about 5p.m. This meant ensuring availability of transport. This also meant any unforeseen delays during the day could not be adjusted for in the evening.

floods and they were worried about their safety. Everybody wanted to talk about the floods and dengue fever.

2.5.7 Field situation and fieldwork experience

Because infant and child deaths are unhappy events in the family, rural people do not generally disclose details to a stranger. In order to obtain reliable information from the rural population it is necessary to win their confidence. I had the advantage of knowing and understanding the cultural norms and using the language to elicit detailed information; I also had the help of some local people throughout the fieldwork.

My first contact in Mewat was with two educated Meo women who were school teachers at Firozpur Jhirka in Mewat and two Meo men, one of whom was an engineer working in the Haryana Government public works department, the other the *sarpanch* of one of the villages in Mewat. I met them during a workshop on '15-point program for the welfare of minorities in Haryana' organised by the Haryana Institute of Public Administration, on 27 September 1995 at Gurgaon. I learnt about this workshop during my visit to the Mewat Development Board in Gurgaon; Mr. Mann, research officer at the Development Board, informed me about this workshop and also gave me a list of people in Mewat who were working for the development of this area.

These four people, particularly the two women who had also been recommended by the Deputy Commissioner of Gurgaon, were extremely helpful and were with me throughout the survey. My initial stay in Mewat was in Bond village, the native village of the two women, where I stayed for about 15 days. During this time I visited all my study villages and all the community development blocks of Mewat region. The Block Development Officers were very co-operative in supplying me with information about the area, detailed maps of the blocks and other leaflets about the Government policies operating in Haryana including Mewat. Sometimes they introduced me people from Mewat who had come for jobs in their office; I often accompanied them during their visits to villages in Mewat.

The Child Development Project Officer of Nuh and Taoru blocks was also very co-operative. She provided me with the list of villages where *Anganwadis* are established, and gave me detailed information about the working of ICDS, the attitude of women in Mewat towards it, and the problems faced by the *Anganwadi Workers* (AWWs). She also gave me a detailed interview that was a useful source of qualitative data used in my study, and helped me contact a number of AWWs in her office: they all visited her office on the ninth and tenth of every month to collect their salaries. It proved to be an important contact point for me and it saved money, time and distance. Because of this I was able to interview fifty-two AWWs.

The local schoolteachers also proved very helpful for the survey; they are highly respected people in Mewat. Many times they sent students of fifth class to accompany the interviewers in the *mohallah* (neighbourhood) if they happened to belong to the *mohallah* in which the interviewers were visiting. The families were very hospitable if interviewers were accompanied by these children, as they would tell the women that their *guruj*i (teacher) had asked them to take care of the interviewers.

On my first visit to any of the villages studied, my first point of contact was either the *sarpanch* or the AWW to whom I showed letters addressed to them from the university. The letters explained the purpose and importance of the study and asked for the co-operation of the villages in the project. Once the *sarpanch* was convinced of the value and purpose of the survey, he or she would persuade the villagers to co-operate. The *sarpanch* also convinced the people that the data would be kept confidential and would be used only for research purposes and would take me to meet the important people.

I would stay in the village before starting to collect the data in order to build rapport with the villagers. Generally the *sarpanch* of the concerned village would organise a meeting with the villagers within a week of the original visit. During this meeting, I was formally introduced, the purpose of the study was explained, the co-operation of the villagers was requested, and villagers were encouraged to ask any questions at this time.[5] I was introduced as currently a student in Australia, but otherwise a lecturer at Government Post Graduate College, Gurgaon. Contact before the interviews had the favourable effect of reducing suspicion and enlisting the co-operation of the villagers, especially the influential leaders. However, these meetings did not always attract the entire village population and some of those who attended did not remember the purpose of the study when the interviewers called on them.

Thus considerable effort was made to build rapport in the sample villages. Most of the people I met greeted me warmly and said that my family and I would be welcome to stay in the village. Sometimes I would stay when I needed to wait until night to meet women who were available only in the evening[6]. During the survey I took care not to wear Western-style dress and tried to avoid using things from the city. Also, I tried to observe the rules governing village life.

In most cases the people were very hospitable. Although informed about the purpose of the study during the village meeting, they would ask me: 'Madamji, why are you taking so much pain in filling out those forms?' They were also interested to know what I would get back from the questionnaires. Distrust of a researcher can greatly hamper fieldwork and affect the quality of information. Although the village *sarpanch* had asked for co-operation from the people, some members of households or respondents suspected that we were government officers sent to report on the activities of Meos. In a few cases, respondents suspected that we were a family planning team and were trying to identify the possible cases for sterilisation by counting the total number of children they had.

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[5] The village meetings were memorable events. They generally took place at night and were well attended. The most interesting aspect of these visits was the intense curiosity about Australia and Australians. They asked many questions about Australia, but few questions about my study. Villagers took it for granted that the study would be conducted in their village and that they would answer the questionnaire. However, they were curious to know about Australian life.

[6] I had to stay quite frequently during harvesting season because many women could not be contacted during daylight hours as they were busy in the fields. They could only be interviewed after hours. Since the interviewers had to go back to the field research station, it meant I had to stay in the village to interview to those women.

In such cases the two Meo women who were assisting me explained my real identity. My student card was also very helpful to establish my identity and I carried with me several letters of introduction from the university stating the purpose of the study. I had to use the letters only when I was challenged, which happened once when a person from the army came for holidays in the village and was told about me. He tried to show his authority and asked me to show proof of what I was doing. The letters of introduction proved satisfactory to him. But for those letters I would have been in a difficult position because verbal explanations did not seem to satisfy him. I also carried with me a letter from the Deputy Commissioner of Gurgaon granting me permission to carry out the survey. This letter was the most effective one, for it was from an official of the Government of India.

I used to carry with me some medicines for common ailments such as sore eyes and diarrhoea together with cloth bandages. Once a woman whom I went to interview complained of loose motions in her two-year son; I made ORT solution and gave it to the child, and asked her to repeat it during the day. Sometimes I had to use medicines from my kit; this gave my role a context. From the beginning of my survey, people wanted to know what use I could be to the village. I tried to explain that my study would probably lead to a better understanding of the problems of the rural people and that perhaps as a result the Government's development plans would improve. However, this explanation did not seem to make any impression upon them; but my help to sick children was a concrete example of my usefulness. This practice brought me close to women and they provided me with some useful information about their health-seeking behaviour. The main disadvantage of this practice was that I had to devote a considerable part of my time to it. On the whole, the respondents were co-operative and willingly agreed to respond if the researcher was patient.

2.6 Ethical considerations

The respondents were correctly informed of the purpose of the study. Questions that arose from respondents were sincerely and appropriately answered. No respondent was forced to participate in the study. Permission was sought first. Two eligible respondents who refused to participate were dropped from the study. They were assured about the confidentiality of the information obtained from them. Discussion and reporting throughout the thesis is carried out in such a way as to protect the identity of the respondents. Anonymity was guaranteed, and where a subject is quoted, a pseudonym is adopted.

2.7 Quality of data

The accuracy of survey data is nearly impossible to measure. First, many questions are attitudinal in nature, and the validity of these responses cannot be ascertained. Second, one does not usually know the 'correct' answer when the questions are factual (Anker, 1973). The errors which may be present in this work are omissions of births and deaths (that is, coverage or completeness of reporting) and misreporting of ages of death of children and ages of mothers at the time of birth.

2.7.1 Completeness of reporting

Omission of live births may not only affect estimates of infant mortality but also distort the effects of factors influencing infant mortality. An omission of a live birth between two live births will increase the length of the birth interval between the two reported live births and reduce the birth order of the child born after the omitted live birth. Hence, the effect of birth intervals and birth order on infant mortality will be distorted.

Omissions are typically more frequent among those events that occurred in the distant past. Older women are more likely to omit births and deaths as they had most of their children further in the past. Also, failure to distinguish between still births and live births may lead to inaccurate reporting. Deaths that occurred in early infancy may also be underreported, as some women may fail to understand the importance to the survey of reporting children that died soon after birth. The omission of births and deaths is difficult to detect from the data unless there is gross underreporting. In this study, omissions of reporting are minimised in several ways and consistency checks are used to evaluate the evidence of omissions of reporting.

First, since the present study is restricted to recent births (during the three years preceding the survey), it is expected that the recency in reporting would keep recall lapse to the minimum. Second, it was possible to check the accuracy of the information on reporting of births because certain relationships were expected. For example, the sex ratio at birth of all reported live births should not have been significantly different from 1.06[7]. Sex ratios that are unusual may be indicative of relatively incomplete reporting of either sex. The sex ratio at birth in the sample was in keeping with this expectation: it was not significantly different from 1.06[8]. The expected biological numerical preponderance of male babies at the time of birth speaks favourably for the data coverage. Moreover, there were comprehensive instructions for the interviewers on all questions, and coverage was deemed to have been quite complete.

Children who died within a short period after birth are frequently omitted in retrospective surveys: people are reluctant to talk about the children who have died because they do not want to remember a sad event. Thus, both events (births as well as deaths) may be missed. During the course of the training of female investigators this point was especially mentioned. The manner in which details of births were recorded enabled the interviewer to switch back and forth easily between ages and years, and identify any large, unexplained intervals in a woman's pregnancy history. The neonatal and post-neonatal mortality rates reveal certain biological patterns when sex of deceased children is considered. In Mewat, the neonatal mortality rate for boys was higher than for girls, but the post-neonatal rate was observed to be higher for girls (Appendix 2.1). This is true in the Indian situation, particularly in North India, where there is a substantial amount of discrimination against girls (Das Gupta, 1987). Thus, the neonatal and post-neonatal mortality rates in the Mewat survey followed the expected pattern, indicating the quality and worth of the data.

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[7] 'The sex ratio in different populations of the world centres approximately around 106 boys to 100 girls, varying only within narrow limits. In this respect, the sex ratio at birth in India shows no discordance.' (Pakrasi and Halder, (1971: 378).

[8] The sex ratio at birth was 1.07 for Mewat as a whole.

2.7.2 Age at death reporting

Misreporting of age at death of a child can introduce serious bias in the estimation of neonatal and infant mortality rates because age is the basis for categorising infant deaths as early neonatal (0-7 days), late neonatal (7-12 days) and post-neonatal deaths (1 month-11 months). A tendency commonly observed is digit preference, which means that because respondents generally prefer certain digits, they 'round off' age at death. Since this study deals with infant mortality (within one year) rather than stratifying neo-natal-post-neonatal, the incidence of age heaping within different months of a one-year period is overcome.

2.7.3 Reporting of the ages of women

Maternal age at birth is one of the important variables in this study. Poor reporting of the mother's age at birth affects the results of the analysis of infant mortality. Mothers who misreport their own age are also likely to misreport their maternity history. One common type of age error is age misstatement or misreporting arising from digit preference, usually occurring at ages which end in 0 or 5. This is largely because some respondents do not know their exact ages and so round their ages to preferred digits. In the absence of any digit preference, there would be an even distribution of women at each terminal digit; that is, there would be 10 percent of the women at each terminal digit (Shryock and Siegel, 1971: 206).

One of the most commonly used measures of digit preference in age reporting is the Myers' Blended Index. This index provides an overall summary of preferences for, or avoidance of, each of the ten digits, from zero to nine. The theoretical range of Myers' index is 0, representing no age heaping, and 90 which would result if all ages were reported at a single digit, say zero (Shryock and Siegel, 1971: 207). Table 2.2 shows the index of the preference for terminal digits in the age range 15 to 44 for the women interviewed in the 1996 Mewat survey, using Myers' Blended Index. There is evidence of a modest preference for ages ending with the digits zero and five and avoidance of digits ending one, three, seven and nine. A summary index of 12.4 was obtained. The corresponding indices for females in Haryana from NFHS and the 1981 Census are 18.8 and 69.5 respectively (IIPS, 1995a; Registrar General of India, 1984).

Table 2.2 Percentage of women reported at each terminal digit according to Myers' Blended Index for ages 15-44, Mewat, 1996

Terminal digit	Percentage	Deviation of the percentage from 10 % (ignore sign)
0	13.8	3.8
1	8.1	1.9
2	11.8	1.8
3	6.8	3.2
4	10.7	0.7
5	13.0	3.0
6	11.4	1.4
7	6.7	3.3
8	11.7	1.7
9	6.0	4.0
Total	100.0	24.8
Index	**24.8/2= 12.4**	

Source: Mewat field data, 1996

Thus the age reporting in the Mewat survey seems to be considerably better than in the NFHS and the census. This is because special efforts were made in the Mewat Survey to minimise age misreporting. The training of the interviewers placed great emphasis on procedures for obtaining as accurate information as possible on women's ages. For women who did not know their age or date of birth, several methods of probing for age were used: asking if the woman had any ration card that might give her current age[9]; asking the respondent how old she was when she got married or had a first child, and then trying to estimate how long ago she got married or had a first child (for example if a woman was 18 years old when she had her first child, and that child was now 11 years old, she was probably 29 years old) and using the calendar of events to locate the women's birth in relation to the dates of major national events. Thus the probing methods were based on the age of the woman at different significant events in her life, such as the birth of her first child, her age at marriage and age at menarche, and

[9] It is, however not known how accurate the ages on ration cards were as they might have been given by the head of the household.

on the time gap between these events. Although age errors cannot be totally eliminated, the comparisons with the Census and NFHS suggest that probing and other elaborate measures used for arriving at the age of the eligible women have helped in reducing the biases in age reporting due to digit preference.

Another type of error is gross age misstatement, which results in inaccurate estimates of rates and proportions that are based on age groups. When the data have no serious age misreporting, under normal conditions of stable fertility, declining mortality and a closed population, the proportion of women in successive age groups would be expected to decrease monotonically with advancing age groups. Deviations from this expected pattern may indicate age misstatement. Table 2.3 shows the distribution of women by five-year age group for Mewat. The results presented in Table 2.3 do not provide evidence of gross misreporting of age of women.

Table 2.3 Percentage distribution of women aged 15-44 years by five year age groups, Mewat, 1996

Age group	Percentage	Number of women
15-19	14.1	63
20-24	21.0	94
25-29	20.1	90
30-34	18.8	84
35-39	15.2	68
40-44	10.8	48
Total	100.0	447

Source: Mewat field data, 1996

2.7.4 Other measures of quality control

One traditional measure of the quality of data is the extent to which information is missing on key variables. Although completeness of responses does not necessarily indicate that the results are accurate, the existence of missing information for a large number of cases suggests that data collection was not carried out with sufficient care. For Mewat, the extent of missing information is negligible on all the key variables like month and year of birth, age at death, age at first marriage, age at first birth, and women's education.

Quality control was also achieved through field editing of questionnaires, observing selected interviews and re-interviewing if necessary. The research assistants were instructed to examine the completed questionnaire in the field in order not to miss any information and to ensure that all necessary corrections were made. Moreover towards the end of each day of data collection the complete schedules were carefully examined to check whether all items were filled out, whether the hand-writing was legible, and whether there were any inconsistencies in the recorded responses. Special attention was paid to missing information, age information and completeness of birth details. In the case of any discrepancy in the available information a follow-up visit to the respondent was made for further clarification, when the respondent was intensively questioned about the problem. In addition, I conducted spot-checks to verify the accuracy of information collected from the respondents.

I carried out the monitoring and supervision of the data collection operations. Throughout the survey, I maintained close contact with members of the research teams through direct communication and spot-checking. The objective was to provide support and advice to the research team in the field and to enhance data quality and the efficiency of interviewers. This objective was accomplished by communicating data problems and possible solutions to the interviewers, reminding them about proper probing techniques and examining their fieldwork.

In transcribing the informal interviews from the women, care was taken to make a verbatim transcription. I translated all the transcripts into English, to ensure standardisation in the translation employed. Most of the colloquial terms were retained in Roman script to fully encapsulate the meaning of these terms. In general, the Mewat survey data set is of good quality due to its well-designed questionnaire and high response rates, as well as close supervision of the fieldwork.

2.8 Methods of data analysis

This section begins with a discussion of the general methodological issue in the analysis of survival data. The term 'analysis of survival data' is used to refer to a broad range of event history analysis techniques. Then, the generality of the proportional hazard model with special reference to infant mortality is discussed. Finally the models used in the present study and the limitations of the analysis are presented.

2.8.1 Methodological issues in the analysis of survival data

In demography, the earliest, best-known, and most widely used statistical device for analysing mortality data and presenting the mortality experience of a population is life table analysis. Although the life table has been used since the eighteenth century, the surge of interest in more modern methods for event history analysis did not start until the late 1950s and early 1960s (Allison, 1984). Stemming mainly from biomedical statistics and, to a certain extent, from industrial machine life-testing, the statistical analysis of survival data has now found its way into social science literature (Zheng, 1993).

In the social science literature, survival data are used in the context of measuring the duration of time until the occurrence of individual life events, for example, death, births, employment, unemployment, marriages and divorces. In survival analysis, interest centres on a group of individuals, for each of whom there is a defined point of time event, sometimes called failure, occurring after a certain length of time; and explanatory covariates of the event. A common problem arising in the analysis of survival data is having only partial information on some individuals, called 'right censored', indicating that the 'event' has not yet occurred before a given time. Thus, observations of this type are called censorship.

2.8.1.1 Censoring

A major source of difficulty in the analysis of survival data is the possibility that some individuals may not be observed for the entire period of observation and censoring exists when incomplete observation is encountered. Figure 2.1 illustrates one typical situation, right censoring of observation. In Figure 2.1, children A, B, and C are under observation from time T_0 to T_1. The solid line represents the risk period for having the event for each child. The solid line with an asterisk (*) at the end point indicates the occurrence of an event of interest. In the case of this present study, the 'event of interest' is an occurrence of infant and child death. Children A and B indicate, respectively, the occurrence of events (deaths) before the end of the observation (the Mewat survey date). The risk period of child C started during the period of observation, however, the event (death) did not occur when the observation was terminated at time T_1.

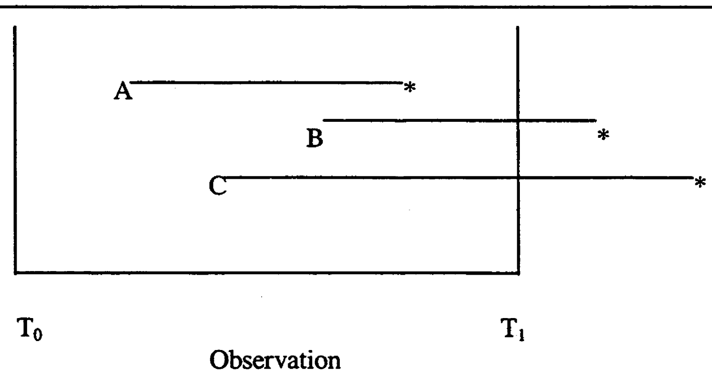

Figure 2.3 Right censored observations

In the present survival analysis of infant mortality, censoring occurred at the same point of time (the Mewat Survey date) for all individuals, and this is something called fixed censoring.

2.8.2 Proportional hazards models

The problem of censoring can be handled through the application of life table techniques (Namboodiri and Suchindran, 1987) or the incorporation of the life table approach into a multivariate procedure (Cox, 1972). A multivariate form of life table analysis, a proportional hazard model, developed initially by Cox (1972), is used in this study. The Cox-regression procedure is a technique for the analysis of 'survival data', that is, data that measure the time until a certain event happens; in the present study the time until a death occurs. Cox's model blends the merits of both life table and regression techniques. Unlike the traditional life-table analysis in which the conditional probability of dying during a given age interval is assumed to be the same for all individuals, proportional hazards models allow for the possibility that the hazard rate of an event (death) may differ between individuals with different socio-economic or demographic characteristics. In other words, life tables are limited by the assumption of population homogeneity and proportional hazards models are useful in overcoming the assumption of population homogeneity by allowing for the formulation of equations relating covariates to the hazard function. Thus, effects of covariates are incorporated into the life table. Moreover, since the proportional hazards model is 'nonparametric in the sense that it involves an unspecified function in the form of an arbitrary baseline hazard function, this model is more flexible' (Kalbfleisch and Prentice, 1980: 70).

Cox's proportional hazards model can be described as follows:

$$\lambda(t; z) = \lambda o\ (t) e^{(\beta_1 z_1 + \beta_2 z_2 + \ldots\ldots\ldots\ldots \beta_k z_k)}$$

$$= \lambda o\ (t) e^{(\beta z)} \qquad \text{(eq. 1)}$$

where $\lambda(t; z)$ representing the hazard function at time t for an individual with k (number) independent variables (z's) which may be either discrete or continuous. β is a vector of coefficients related to specific independent variables to be estimated (e.g., mother's education, father's education, father's occupation, and drinking water). $\lambda o(t)$ is an arbitrary, unspecified baseline hazard function. The baseline hazard function is defined when all independent covariates in a proportional hazard model take a value of zero.

This is similar to a constant in an ordinary least-square regression analysis except that $\lambda o(t)$ takes a different value at each time t. For instance, in the present study the hazard function refers to the probability of an infant's death at each point in time t during his or her first year of life with k independent covariate z.

The hazard function facilitates calculation of the relative risks of certain groups in relation to specific baseline groups by exponentiating the coefficients (by taking their antilogs). That is, if β is the hazard coefficient, just compute e^{β}. $Exp(\beta)$ or e^{β} represents the risk of dying associated with each covariate, relative to the risk for the reference category. The relative risk for the reference category of each covariate is unity. Values greater than unity indicate that the relative risk of dying is greater for this group compared with the reference group, whereas values less than unity indicate a decrease in the risk (Pebley and Stupp, 1987: 49-50; Santow and Bracher, 1994: 482). The regression coefficient indicates the relative effect of the covariate on the hazard function. These coefficients vary around zero. A positive coefficient increases the value of the hazard function and therefore indicates a negative effect on survival time. A negative coefficient decreases the value of the hazard function and therefore indicates a positive effect on survival time. Therefore, in this study, a positive coefficient indicates a greater probability of hazards risk of infant mortality; and a negative coefficient indicates a smaller hazards risk of infant mortality.

In the above proportional hazards model (Equation 1), the event of interest for the present study is an infant death in the first year of life, and one of the goals of this study is to examine how the hazard risk of infant mortality depends on the explanatory variables. All the covariates intended for the present survival analysis (e.g., education of the mother, education of father) are time-constant independent variables. That is, they do not change in value over time.

2.8.3 The dependent variable used in the present study

The dependent variable used in this hazards model analysis is infant survival time, which is measured as the duration in months starting from the infant birth to death (if the event occurred) or from the infant birth to the survey date (censored data).

Corresponding to this very special nature of the dependent variable in the hazard model analysis, the SPSS program[10] for estimating this model requires that the data on the dependent variable be composed of two parts: a dummy variable ('whether the child is alive'), indicating whether or not the event (infant death in this study) occurred during the observation period; and a variable giving either the time of the event occurring or the time of censoring (variable status, a new recorded variable). In the present study, for those infants who died during the observation period, the second component of the dependent variable was the number of months from birth to death. For those infants who did not die by the date of survey (those who survived the observational period), the survival data were censored at the date of survey. Our study data show that among 950 observed cases, 83 infants died before their first birthday and the remaining 876 cases were censored.

2.8.4 Estimation of proportional hazards models in the present study

In this study both univariate and multivariate models were conducted for each of the three areas of interest (demographic, maternal health and cultural, socio-economic and environmental covariates). The univariate hazard analysis was mainly designed to identify the covariates most significantly associated with infant mortality within each theoretical area. Then multivariate analysis was conducted to explore the net effect of variables within each of these groups. Initially, models were run which included all factors that were included in the univariate analysis. Those variables which were not significant in the univariate analysis, generally remained insignificant in multivariate analysis. Hence, the variables which failed to show any significant effect on the relative risk of dying during infancy were dropped from the multivariate analysis. The results in the univariate model describe the gross effects while the results in the multivariate model describe the net effects, that is the effects after controlling for the effects of other variables in the model. A variable was considered significantly associated with mortality when its *p* value was below 0.10. This relatively high significant level was chosen instead of the usual 0.05 in order not to miss any possible variables associated with infant

[10] The Statistical Package for Social Sciences (SPSS) for Windows was used to carry out the analysis.

mortality. The -2 log likelihood ratio test was used to examine the strength of the association between a particular independent variable and a dependent variable.

2.9 Independent variables used

The independent variables used in this thesis fall into three broader categories: demographic, maternal health and cultural; socio-economic and environmental. Detailed descriptions of those variables are given in individual chapters. The choice of these variables was guided by the literature on determinants of infant mortality. The categorisation of the independent variables was based on theoretical grounds, as well as on the basis of the distribution of births with respect to the different variables. A partitioning of the sample according to various background characteristics of its members produces such small subgroups that estimates are unstable and the interpretation of results difficult. Hence, the distribution of variables was collapsed into two broader categories in order to alleviate the problem of excessively small cell size. All the independent variables included in the regression analysis were coded as dummy or dichotomous variables.

2.10 Limitation of analysis

One important limitation of this kind of study is that the deaths of children are related to characteristics of the family at the time of survey. Because the household and socio-economic covariates are available only for the time of the interview and the living standard of the family may change during the period, it is likely that a child born in the most distant past was exposed to the risk of death under a different set of socio-economic conditions from those recorded in the survey. Thus, to ensure that the household and socio-economic covariates provide an accurate picture of actual living conditions, I limited the sample to births in the last three years. Limiting the analysis to births in the last three years reduces the time differentials between the two variables, but it does not eliminate the problem. However, there is no documented evidence which suggests that the living standards have changed rapidly in Mewat.

The principal weakness of these data is the small number of deaths on which they are based, relative to the inferences I desire to make. The total sample used in this analysis contains 950 singleton births, of which 83 had died in infancy by the time of the survey. Since the primary focus of this study is differential mortality and not the overall levels of infant and child mortality, these numbers are adequate for studying the determinants of infant mortality. Moreover, the underlying purpose of this survey design was the maximisation of the quality of the information while at the same time obtaining a sample size large enough for mutivariate analysis. The fixed budget of time and money necessitated a choice between quality and quantity. Quality of information was generally favoured over the size of the sample. With this in mind, sample villages were visited several times before interviews were conducted.

2.11 Summary

In this chapter, the research setting, research design, data sources, field work, data quality and actual methodologies employed for analysing the data have been discussed. This study adopted both qualitative and quantitative approaches to data collection with the aim of finding the best way of gathering information. The 1996 Mewat survey provided the quantitative data base for the thesis. Qualitative data consisted of participant observation, informal interviews and in-depth interviews with key functionaries.

Considerable effort was made to maintain the quality of data, especially to collect correct age information of the women and children.. The theoretical and empirical evidence supporting the findings of the study indicates data validity. The data quality is supported by the sex ratio at the time of birth, neonatal and post-neonatal mortality rates, and a low Myers' index of digit preference. The main limitation of the data is small sample size. Given budget limitations, quality of information was favoured over size of the sample. The 1996 Mewat Survey, besides being the first comprehensive data set on Mewat, is of a quality which proves to be better than some other sample surveys conducted for mortality analysis. It must be remembered, however, that Mewat is a small part of India; thus the findings should be generalised with caution.

CHAPTER THREE

A WINDOW ON MEWAT

3.1 Geographical setting

The triangular area formed by the Delhi-Jaipur, Delhi-Agra and Agra-Jaipur highways is known as Mewat. It is situated immediately to the south of Delhi and comprises of parts of the districts of Gurgaon and Faridabad in Haryana, and Alwar and Bharatpur in Rajasthan. The majority of the region is in Haryana. The Mewat region, which is named after its main inhabitants, the Meo community, is not a region in a statutory sense; rather it is a distinct ethnological and socio-cultural tract (Government of Haryana, 1993). The overwhelming concentration of the Meos, who have been its traditional inhabitants, has given Mewat its essential cultural identity.

The Mewat region of Haryana consists of six community development blocks: five blocks of district Gurgaon, Nuh, Ferozepur Jhirka, Punhana, Taoru and Nagina: and Hathin block of the adjoining Faridabad district. The area has an uneven topography of plain and undulating patches of land dotted with the hills and hillocks of the Aravali mountain range. Mewat is predominantly rural, covering an area of 1874 square kilometres. The population of 700,000 inhabits 491 villages and five townships (Mewat Development Agency, 1995a). The main occupation of the people is agriculture or agriculture-based activities.

3.2 Profile of Mewat region

Tables 3.1 and 3.2 present some basic indicators for Mewat. Ninety-three percent of its total population resides in rural areas with little variation in the sex ratio of Mewat as a whole and the rural and urban areas of Mewat. The sex ratio of Mewat is below Gurgaon district (871) but equal to Haryana State as a whole (865) (Government of Haryana, 1993). The proportion of scheduled caste population is very low in Mewat

(9%) compared to Gurgaon district and Haryana State as a whole, where the percentages of scheduled caste population to total population are 14 percent and 20 percent respectively (Government of Haryana, 1993).

Table 3.1 Demographic profile of Mewat

Population of Mewat	Total	Males	Females	Sex ratio: Females per thousand males
Total population	693,667	371,833	321,734	865
Total rural	644,586	345,520	299,066	865
Total urban	48,918	26,313	222,605	859
Scheduled caste	65,118			
Density	370 persons per km^2.			

Source: Mewat Development Agency (1995a)

Note: Figures in brackets are percentages of total population.

Mewat has a subtropical continental monsoon climate with a hot summer, cool winter and unreliable rainfall. Rainfall is low and mainly concentrated during the monsoon season. Mewat has a varied topography with alluvial plains, several lakes and a small hill range. The hill range, which runs on the western part of the region, is a part of the Aravallis, which are one in the oldest mountain systems of the world. The soil of Mewat varies from sandy to loamy and certain low-lying parts have clayey soil, with a tendency to salinity. Some parts are prone to floods. The underground water level under the rocky surface is quite deep. Irrigation facilities are poor but are improving, giving a hope of prosperity to farmers whose mainstay is agriculture.

3.3 Backwardness of Mewat

> Mewat is historically and culturally important but educationally and economically backward. It is a peaceful belt with simple and peace loving people and has no violence and communal problem. It is a region where only poverty and ignorance thrive. The factors for backwardness of the region may be poor soil conditions, natural calamities, inadequate irrigation facilities and relative low level of literacy (Government of Haryana, 1993: 19).

Table 3.2 Mewat at a glance

Topography of Mewat	
Total area (km^2)	1874
Total number of villages	491
Total number of towns	5
Total number of blocks	6
Total number of villages and towns attached to roads	422
Total number of villages electrified	418
Climate	
Average annual rainfall (inches)	
Agriculture (1992-93)	4.78
Total cropped area (ha.)	199,581
Net sown area (ha.)	130,461
Area sown more than once (ha.)	69,120
Total area under forest (km^2)	6,618
Fertiliser consumption (tonnes)	6,933
Number of seed stores of Cooperative/ Agriculture department	19
Number of private dealers in fertilisers	7
Number of tractors	2,449
Irrigation	
Net irrigated area (ha.) (1991-92)	42,416
Number of tubewells and pumps	12,667
Animal husbandry	
Total livestock	398,140
Number of veterinary institutions	103
Health	
Community health centres	2
Primary health centres	13
Sub-centres	82
Ayurvedic practitioners	26
Homoeopathic practitioners	11
Education	
Number of primary schools	344
Number of middle schools	53
Number of high schools	48
Number of senior secondary schools	5
Colleges	3
Industrial training institutes	3
Polytechnics	1
Teacher training schools	1
Banks	
Total number of banks	41
Other	
Telegraph offices	4
Post offices	43
Registered industries	4,097
Unregistered industries	110

Source: Mewat Development Agency (1995a)

Haryana State as a whole is fairly well developed and has the second highest per capita income in India (Government of India, 1998). Compared to other parts of

Haryana, Mewat has remained backward. The area lags behind the rest of Haryana State in almost every index of development. The Mewat Development Board headed by the Chief Minister of Haryana State was set up on 16 January 1980 with the sole objective of ameliorating the conditions of poverty, unemployment and economic and social backwardness to raise the standard of living of the people of this area which had shown few signs of improvement despite the development programs undertaken during successive five-year plans (Government of Haryana, 1993). The Mewat Development Board is a policy-making body which has overall charge of formulation, implementation and review of special schemes in the area. Table 3.3 gives an indication of the comparative backwardness of Mewat as regards selected socio-economic indicators compared to Gurgaon District and Haryana State.

3.3.1 Economic backwardness of Mewat

While Mewat has more cultivated area as compared to Gurgaon district, it lags behind the district and the state as a whole in irrigation intensity, which affects production. Half of its cultivated area is irrigated compared to 64 percent of Gurgaon District and 78 percent of Haryana State as a whole. The bulk of the area either depends on rainfall or irrigates land by means of tubewells, wells and pumping sets. Only small parts of Nuh and Ferozepur Jhirka blocks have benefitted from the Gurgaon and Agra Canals (Government of India, 1988).

Mewat has a working population comparable with the District and State. According to the 1991 Census of India, 30 percent of its population are main workers compared to 32 percent for the district Gurgaon and Haryana State as a whole. Seventy-two percent of its main workers are engaged in agricultural activities, which include cultivators and agricultural labourers, compared to 51 percent for the district of Gurgaon and 55 percent for the State as a whole. The proportion of main workers engaged in industry is only 3 percent in Mewat compared to 10 percent in Gurgaon district and 12 percent in Haryana State as a whole. Thus, Mewat has remained an industrially backward area.

Table 3.3 Development indicators of Mewat

Development indicators	Haryana State	Gurgaon district	Mewat
Agriculture			
Cultivated area as percentage of total geographical area	85.8	78.5	79.8
Forest area as percentage of total geographical area	3.8	4.4	4.0
Irrigation intensity	150.6	124.8	93.5
Total irrigated area as percentage of total cultivated area	79.8	63.6	50.7
Economic/ industrial			
Working population as percentage of total population	31.6	31.7	30.3
Agricultural workers as percentage of total workers	54.5	51.2	72.0
Workers engaged in industry as percentage of total workers	11.53	9.6	2.7
Other workers as percentage of total population	36.4	38.5	25.3
General services			
Number of hospitals/ dispensaries per 100,000 population	18.0	19.0	9.0
Percent of total eligible couples effectively protected for family planning	58.5	55.0	44.2

Source: Mewat Development Agency (1995a)

Gurgaon district was also industrially backward until independence was achieved in 1947; since then, the district has made rapid progress in the field of industrial development and various modern industries have been established. The number of registered factories in 1951 was estimated as 27 only, but by 1990 there were 4,843 registered factories in Haryana, of which 293 were in Gurgaon district employing 15,952 workers (Government of Haryana, 1991). The large and medium-scale industries produce cotton yarn, building hardware, wristwatches, motor cars, printing machines and oxygen gas. The Udyog Vihar Industrial Complex located at Gurgaon, which has been developed as the state's first electronic complex, is located about 60 kilometres from Mewat. Japanese City is also a new development of Gurgaon.

Now because of shortage of land in Gurgaon district and also Government benefits for industries established in backward areas, a number of large and medium industries are being established in Mewat which has been declared a backward area by the state government. At Rozka Meo, which is a part of Mewat area, an industrial estate has been developed. The Government of Haryana has acquired an additional 200 acres of land at Rozka Meo. This additional developed land will accommodate new entrepreneurs from Delhi area who are interested in taking up their industrial ventures in the backward area of the district.

3.3.2 Educational backwardness of Mewat

Compared with rest of the state, the literacy rate in Mewat is very low; female literacy is almost negligible. After industrial backwardness, this is the second biggest problem of this area (Mewat Development Agency, 1995a). Table 3.4 provides information on the educational levels of Mewat compared to the state and Gurgaon district.

Table 3.4 Educational indicators of Mewat

Literacy rates	Haryana State[a]	Gurgaon district[b]	Mewat area of Gurgaon district[c]	Non-Mewat area of Gurgaon district[c]
Overall				
Males	69.1	67.9	30.2	66.5
Females	40.5	34.9	10.2	42.4
Total	55.8	52.6	25.1	55.3
Rural				
Males	64.8	48.6	36.2	63.7
Females	32.5	19.9	7.6	35.1
Total	49.8	35.3	22.9	50.4
Urban				
Males	82.0	70.8	62.3	72.6
Females	64.1	55.0	41.2	57.9
Total	73.7	63.5	52.5	65.7

Sources: [a]Registrar General of India (1991); [b]Government of Haryana, (1993); [c]Mewat Development Agency, (1995b)

Table 3.4 highlights regional disparities (Mewat area as compared to the non-Mewat area), gender disparities, and rural-urban disparities. The overall literacy rates for the Mewat and non-Mewat areas of Gurgaon District are 25 and 55 percent, whereas for Gurgaon District and Haryana State as a whole literacy rates are 53 and 56 percent respectively. Thus Mewat area is much below the state level in overall literacy.

The male and female literacy rates for Mewat area of Gurgaon district are 38 and 10 percent respectively. The corresponding figures for the non-Mewat area of Gurgaon District are 66 and 42 percent, for Gurgaon district as a whole 68 and 35 percent and for Haryana State 69 and 40 percent respectively. Female literacy is always low compared to male literacy in India, but this is more pronounced in the case of Mewat region where the rate for males is roughly four times that for females. The male-female disparity is also very high in rural areas compared to urban areas. The rate of literacy in rural Mewat is 23 percent; 36 percent of males but only 7 percent of females are literate. Thus the rate for males is approximately five times that for females. The total, male and female literacy rates for the urban areas of Mewat are 52, 62 and 41 percent respectively.

In Mewat area there is a very high dropout rate of girl students after primary and middle school, and especially at senior secondary level. In 1992-93, 18973 girl students were enrolled at primary level. Out of these only 2983 progresses to middle level, 1186 progressed to high school level and only 469 to senior secondary level (Mewat Development Agency, 1995b). In Mewat a high proportion of girl students leave school after completing primary education. The main reasons for the around 80 percent drop out rate at higher secondary level are the lack of separate girls' schools at this level and the unavailability of Muslim women to undertake teaching jobs in Mewat. In 1993-94, there were 62 schools at primary level exclusively for girls. This number declined to four at middle level and six at high-school level. But at senior secondary level there is no separate school for girls in Mewat (Mewat Development Agency, 1995b). To continue their education, girls have no alternative but to go to co-educational schools. Because of this heavy dropout rate most girls are unable to graduate or obtain a Bachelor of Education (B.Ed.) degree and so are unfit for employment as teachers in government schools. They are also unable to start their own schools because of low levels of education.

Moreover the overall quality of the education system in Mewat is poor. Unavailability of teachers is one reason for this situation. There are many primary schools where two teachers were posted but they visit the school in rotation. Moreover, most of the teachers employed in the education department came from outside, and

Mewat being a most backward area, they regard their posting in Mewat as punishment. High rates of absenteeism were observed among these teachers (Mewat Development Agency, 1995).

3.4 Ethnic composition of the population

The Meos constitute one of the major communities of Mewat region. Most of the rest are Hindus with a small proportion of Sikhs, but all claim to be Mewatis culturally (Rathee, 1971a). The Census of India does not list the Meos separately. It was only in the 1901 census that Meos were counted as a separate group. According to the 1901 census, there were 335,164 Meos in India, most of whom lived in Mewat (Risley and Gait, 1901). The Mewat Development Agency (1995a) had tried to locate the minority concentration area of Gurgaon District on the basis of the 1981 census, which had reported the breakdown by religion separately. From the 1981 Census it was clear that in Mewat Muslims accounted for more than two-thirds of the total population of Mewat. From my own experience and based on various studies, it can safely be concluded that Meos constitute from 40 to 55 percent of the population of Mewat. Firozepur Jhirka Tehsil, which includes the development blocks of Ferozepur Jhirka, Nagina and Punahana, has the highest concentration of Meos, followed by Nuh Tehsil, which includes the development blocks of Nuh and Taoru.

Minas, Jats, Ahirs, Gujjars, Rajputs and scheduled castes are the major Non-Meo communities of Mewat. These are Hindu agricultural communities who follow Hindu modes of worship, caste system and village exogamy. Meos are Muslim converts but they achieved a cultural synthesis between their original Hindu culture and Islam. The basic culture (referred to as 'Mewati culture') of both Meo and Non-Meo communities has the same structure of family, *got* or *gotra* (clan), village exogamy and lineage. The following section establishes the historical significance of Meos and describes the features of Meo society in the context of Non-Meos.

3.4.1 Meos, traditional inhabitants of Mewat- an historical perspective

There are three main historical features of the Meos (Sharma, 1982): their conversion to Islam, their plundering role in history and their involvement in the riots of partition days.

3.4.1.1 The Meo conversion to Islam

Former Hindus, the Meos are Muslim converts now, though it is difficult to identify the exact time of their conversion to Islam: historians differ in this regard.[1] It may be reasonable to conclude that it started at the time of Mahmud of Gazna in the eleventh century. One of his very young and able generals, Sayyid Salar Masud,[2] defeated Tejpal (a Meo chieftain) at Dhandgarh near Rewari, and came to be known as the first Meo Muslim (Mewati, 1974: 319-20). However historians are still in search of evidence which may establish the time when Meos were last heard of as unconverted and the time when they were reported as converted. Until evidence is found, all we can say is that the Meos were converted to Islam sometime during the Muslim rule of India. Moreover, in view of the dearth of authentic documents it is not easy to determine if their conversion was voluntary, induced, or forcible. But their present socio-religious composition suggests that Meos may have been converted collectively (Sharma, 1969). Conversion of the Meos to Islam did not result in any major upheaval in their socio-cultural life until recently.

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[1] Though some historians have speculated that they might have been first converted to Islam at the time of the attack of Mahmud-bib-Kasim (Mewati, 1974: 317) in AD 711, and that when they fought at Somnath against Mahmud Gazna, they were already Muslims (Haye, 1969: 294), the first proof of conversion is found at the time of Sayyid Salar Masud (Mewati, 1974: 319-20). While Hunter (1908: 411) suggests the conversion at the time of Mahmud Gazna in the eleventh century, Cunningham (1885: 11) argues it was not before the time of Feroz Tughlaq (early decades of the fifteenth century).

[2] This may also be corroborated by the field observations that Salar Masud is the most revered Sufi saint for the Meos, who swear by his name. Even territorial disputes were solved with the help of the flag (which is considered sacred) of the saint (Powlett, 1878: 70). A *pakka chabutara* (raised platform) in his name is often found in the Meo villages. Furthermore, they make pilgrimages to the tombs of the famous Sayyid Salar Masud in Bahraich in Oudh, and consider the oath taken on his banner the most binding. This indicates that the Meos' process of conversion most probably began in the time of Mahmud of Ghazni.

3.4.1.2 The Meos' plundering role in history

A second noteworthy fact about the Meos is their history of raiding. Historical accounts are strewn with references to Mewati raids on the city of Delhi and punitive expeditions sent by the Sultans (Muslim kings) against them (Powlett, 1878: 200; Crooke, 1896: 492; 1907: 143-144; Haig, 1928: 72; Powell-Price, 1955: 125; Husain, 1963: 448; Lal, 1963: 58; Elliot and Dowson, 1970: 104). They played a leading role in raiding the city of Delhi, especially after the advent of Muslim rule in India, and thus always posed a problem of law and order to the rulers in Delhi. Mujeeb (1967: 218-19) quotes Barani:

> In the middle of the thirteenth century, the Meos who lived in the hilly areas west and south of Delhi not only plundered people on the highways around Delhi but even stole into the town. They came up to the Haud-I-Shamsi, molested water-carriers and maid servants, who came to draw water, stripping them and walking away with their clothes.

Commenting on the frightening reputation Zia-ul-din barni writes in his Tarikh-I-Feroz Shah:

> The daring of the Mewattis in the neighbourhood of Delhi was carried to such an extent that the western gates of the city were shut at afternoon prayer, and no one dared to go out of the city in that direction after that hour, whether he travelled as a pilgrim or with the display of a sovereign (Elliot and Dowson, 1970: 104).

This predatory tradition of the Meos has many implications. First, it set them at war with Muslim rule throughout the medieval period. Second, their recurrent confrontation with Muslim rule stood between them and Islam, despite their conversion to Islam. Third, these confrontations reinforced the solidarity of the community, forging a strong ethnic identity among the Meos. Finally, because of their awkward state in respect of religious adherence, the influence of religion declined and ethnic tradition became the main force regulating their social life (Sharma, 1982).

3.4.1.3 The Meo involvement in the riots of partition days

The third event of importance relates to their involvement in the riots of partition days. Until the time of partition in 1947 the dual religious allegiance of the Meos was never challenged by their Hindu neighbours in Mewat. It is said that some jats of Rajasthan attacked the Meos, regarding them as Muslims on account of a vigorous

Islamic revival among them carried on by the *tablique*, an agency working for perfect Islamization of the Meos. True to their predatory tradition, the Meos retaliated, with the consequence of a disastrous communal conflict (Sharma, 1982). Meos who lived in Bharatpur and Alwar suffered considerable losses in life and property because the Hindu *Maharajas* of these princely states used their organised strength against them. Many Meos believe that these were two main reasons for the action of the maharajas: the Meos had always been difficult subjects to control, and this was a chance to punish them; and the maharajas of both states, particularly Bharatpur, were strongly influenced by the *Rashtriya Swam Sewak Sang* (RSSS), the militant Hindu organisation (Aggarwal, 1969). The untouchable Hindu castes, such as the *chamars,* proved to be the strongest antagonists of the Meos. They not only assisted the princely state troops in pursuing the Meos, but also helped to destroy Meo property. Their motives in this were both resentment against Meo dominance, and also the desire to acquire land. The result of the disorders was that a large number of Meos emigrated to Pakistan and many temporarily moved to nearby areas of Punjab.

This event was a turning point in Meo social history and it had many consequences of great significance. First, it was a severe blow to Meo Hindu identity, which had been maintained for centuries despite their being Muslim converts. The Hindus no longer regard the Meos as high-caste Kshatriyas, and the Meos no longer think of themselves as Hindus, even though in many ways they continue to act like a caste group in the village context. The happenings of the partition days led them to a sudden, certain and shocking realisation that their fate was no longer tied up with the Hindus, but instead it came to be joined to Islam (Sharma, 1982).

Secondly, it undermined their privileged position as a dominant land-owning group, for many of the refugees and low caste people confiscated the land abandoned by the Meos who temporarily emigrated to Pakistan. Moreover, the low-caste people of Mewat try to emulate the ways of the Twice-Born castes in order to raise their own status. The *chamars* in Mewat now refuse to accept cooked food from the Meos, insisting that the latter are Muslims and therefore outside the caste structure. This irks the Meos a great deal and has increased their antagonism (Aggarwal, 1969).

Thirdly, it offered a powerful impetus to the *tablique* movement, which became all the more active and popular following the communal riots. Disillusioned by the happenings, the Meos softened their attitudes towards this movement, which in turn has been instrumental in redefining the self-perception of the Meos as Muslims (Sharma, 1982).

3.5 Features of Meo Society

3.5.1 Ethnic Composition

Internally, the Meos are divided into a number of exogamous groups called *got*, *pal* and *thama*. The membership of these groups is hereditary and is based on patrilineal descent. Traditionally, the Meo community is composed of 52 *got* (clans) and twelve *pal* (expanded clans). One often hears the expression *'bara pal aur bavan got'* (12 *pal* and 52 *got*) being used by the Meos whenever they refer to the totality of the Meos. Actually, the number of *pal* is thirteen, although the thirteenth is referred to as *pallakara,* meaning half-*pal*. Except for its appellation, *pallakara* is treated as a *pal* for all practical purposes. Each *pal* is traditionally associated with a territory. The region of Mewat can be seen as subdivided into thirteen distinct tracts, each belonging to a *pal* and known by the name of that *pal*. The boundaries of *pal* territory are no longer very clear. Earlier, each *pal* had a chief called *chaudhary* who had an important place in the political structure. Of the total Meo population, those belonging to the *pal* are called *'paliya'* and the remainder are known as *'nipaliya'*.

Each *pal* is further divided into *'thama'*, a group of those members of a *pal* who consider themselves as being descended from one of the sons of the *Dada* (forefather) of the *pal,* and inhabit a particular area. Every *pal* has branched off into further units and these units are known as *thama*. The members of a *thama* vary from *pal* to *pal*, ranging between two and nine in every *pal.* The *thamas* are named either after the ancestor or after the original village of the ancestor. Each *thama* also has a *chaudhary*, whose office is hereditary. The *thama* have political as well as social functions: the latter are most relevant in matters relating to marriage and divorce (Marwah, 1979).

A *got* consists of the descendants of a common male ancestor whose genealogical relationship is not exactly traceable. Members of a *got* may be dispersed, but usually a cluster of contiguous villages is inhabited by the *sehgotia* (people of the same *got*). To clarify the relationship between the social units *pals* and *gots*: they are essentially exogamous patrilineal clans, each unit reckoning its lineage from an ancestor. The only difference between the two is in size. Thus, a *pal* is an expanded *got*, that is, a numerically significant clan. As regards intra-village location of *pal* and *got*, a small village is usually inhabited by a single *pal* or *got*. A large village, on the other hand, is multi-*pal* or multi-*got* in its composition. But even in multi-*pal* or multi-*got* villages a *pal* or a *got* tends to inhabit a complete locality or a few localities, which are, in turn, known after the name of the numerically dominant *pal* or *got*.

The *got* are exogamous groups. Many of the Meo *got* have names in common with the *got* of non-Meo communities such as the Jats, Gujjars and Minas. It is important to note that many of the Rajput, Jat and Mina villages are structurally associated with one or another Meo *pal*. The implication of this structural link is that the Hindu villages affiliated with one Meo *pal* would fight against the Hindu villages connected with another Meo *pal*, should the two *pal* come into conflict. The sociological significance of this alliance is that it cuts across religious loyalties. It is also confirmed by the popularity of the saying among the Meos: '*Jat ka kya Hindu, Meo ka kya Musalman*' (Meos are hardly Muslims and Jats are hardly Hindus).

Any account of ethnic composition of the Meo community would be incomplete without an outline of its functional significance. Some observations are in order.

First, the *got*, *pal* and *thama* form the basis of social differentiation rather than stratification (Sharma, 1982). The 52 *got* do not form an evaluative rank order, nor do the thirteen *pal,* let alone the *thama*. Instead, they remain schemes of inherited social differentiation. Accordingly, a Meo is always proud of his *got* or *pal*. Indeed, he is as much conscious of his *got* or *pal* identification as of being a Meo.

In the second place, they are effective in defining and regulating the scope of mate-selection among the Meos. It is forbidden for a Meo to marry within his own *got*, *pal* or *thama*. Fellow-members of *got* and *pas* are looked upon as agnates. Some *got* are spouse-receivers, others the givers. Some *got* and *pal* are both receivers and givers. The subdivisions of a *pal*, the *thama*, are treated likewise. The rules governing the selection of a spouse are complex and involve various degrees of prohibition such as the avoidance of cross-cousins, those from one's own village, or from one's mother's brother's village. Sharma (1969) discussed in detail various aspects of *got*, *pal* and *thama* exogamy as practised among the Meos.

Finally, the role of these ethnic entities, *got*, *pal* and *thama* takes on a new meaning in view of the Meos being Muslim converts. The rules of exogamy have shown a great deal of persistence in spite of the Islamic character of the community. By themselves, these rules do not go against the laws of *Shariat*, but in the case of marriage between prohibited categories of individuals the customary rules are given precedence over the laws of *Shariat*. Despite the plethora of efforts made by the *tabliquis* to impress upon the Meos the reprehensibly un-Islamic character of these exogamous practices, the Meo strictly adhere to their prevailing stubborn norms of *got*, *pal* and *thama* exogamy. This practice of exogamy is essentially Hindu.

3.5.2 Marriage

In keeping with the dual heritage in all matters, the Meos, while accepting child marriage from the Hindu rural pattern, indulge in extravagance in the marriage ceremonies of both sons and daughters as a legacy from the Muslim culture of northern India. Indeed, the incredible lavishness to which Meo families are prone and which the community as a whole encourages and almost compels individuals to practise, has become one of the distinguishing features of the Meo pattern of life (Amir-Ali, 1970: 66). The following excerpts from Amir-Ali's (1970) work make clear the extravagant nature of Meos:

> Every man has to spend on his children's weddings as much as he can conceive of spending - all that he has and all that he can borrow. It is only by such lavishness that he can bring honour to himself, his *gotra* and his *pal*...If a particular Meo hesitates, or falls short of cash, in the midst of the festivities, the people of his *gotra* and others of his village, both Hindus and Muslims, offer to help. Some even spend on his behalf. Others advance amounts which he might not be able to pay back till the end of his life... The village *Bania* (money lender) stands conspicuous during the marriage ceremonies and proudly offers to make available any amount of cash or commodities which the Meo may need, to maintain the honour of the village...Musicians, dance-parties, *mirasies* or bards who sing of the heroic deeds of the ancestors, are paid fantastic sums. Fire-works defy the darkness of night. In contrast to their poverty fabulous gifts are exchanged between the parties of the bride and the bridegroom. A bride-groom and even the bride-groom's father are known to have weighted in silver! (Amir-Ali, 1970: 66).

Two factors are mainly responsible for this extravagance. First is the reputation for lavishness which the Meos have inherited from the days when individuals acquired wealth by loot and robbery and the community beguiled them into sharing it with others. The second factor contributing to this recklessness is the inter-*gotra* rivalry and competition. The individual has to uphold not only his individual status, but also the status of his *gotra* against that of the *gotra* into which his son or daughter is married (Amir-Ali, 1970: 68).

As in several Hindu communities, it is not the Meo girls' families who have to seek boys and lure them with dowries. Rather, brideprice is paid, a practice associated with the low castes in Hindu society. While Amir-Ali (1970) attributes this to the household utility of Meo women, Aggarwal (1971) says that the adoption of the brideprice by the Meos is facilitated by the fact that they are becoming more Islamised and are relatively unconcerned about the prevailing values among Hindus. Sometimes, by paying the brideprice, the girl's father may repay a debt, or a debt may be partly repaid through an adjustment in the brideprice (Aggarwal, 1971).

During my field survey I observed feelings against brideprice and some Meo families giving dowries. One woman told me: 'Well, not all Meos pay brideprice. Some give dowry. There are all types of people. You cannot generalise them'. One Meo mother complained 'These days things are going from bad to worse. People are demanding three to four thousand rupees for child brides four to five years old'. Another Meo woman said: 'With the custom of brideprice becoming more common, the incidence of cheating has increased. People take brideprice for a child bride and before *Gauna*[3] marry her again to some other person and demand brideprice from him also'.

3.5.3 Caste system

Caste is a social group characterised by endogamy, hereditary membership, and a place in the caste hierarchy (Aggarwal, 1971). This is an essential feature of Hindu society. The Meos have the essential characteristics of a caste, i.e. a rank in the hierarchy, and hereditary membership. They perceive themselves as being high-caste: *unchi jati* or *unchi quam*. They practise endogamy rigidly. An element of hierarchy is evident in their relationship with other castes. They treat the Hindu *chamar* and *bhangi* as untouchables. They have a *jajmani* relationship with both the Hindu and Muslim castes such as *kumbhar* (potter, Hindu), *lohar* (blacksmith, Muslim), *khati* (carpenter, Hindu or muslim), *chamar* (leather-worker, Hindu), *bhangi* (scavenger, Hindu), and *mirasi* (entertainer, Muslim). The high-caste Hindu Brahmins work out auspicious dates for marriage for Meos. The Muslim *mirasi* and *jogi* are still treated as inferior (*chhote log*), and the Meos do not like to accept food from them.

3.5.4 Family and kin

The minimum social unit is the *ghar* (family) which approximates a 'joint family'. Although cases of secession from the joint family are not uncommon, they do not suggest decay of the institution of joint family among the Meos. The joint family may be further subdivided into two types: lineal joint and collateral joint. The lineal joint family consists of husband, wife, married sons and unmarried daughters. The collateral joint family consists of married brothers living together. The lineal type of joint family obtains in greater proportion than the collateral, which is not so common among the Meos (Sharma, 1982). Another family type is based upon the polygynous family composed of a man and more than one wife. Among the Meos, a polygynous family comes into being through the practice of levirate, when a married man marries his brother's (usually elder brother's) widow, or it may be resorted to when the first wife has failed to bear a child

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[3] Ceremony, sometimes several years after marriage, when the bridegroom brings his bride from her parents' village to start living in his home.

(Marwah, 1979). Levirate is very common among the Non-Meos, particularly among Jats.

The Meo family is patrilineal, for descent is reckoned along the male line. It is also patrilocal, as the norm requires the woman to change her domicile at marriage. Accordingly to the rules of authority, it is patriarchal. The head of the family is generally the eldest male and the transmission of authority follows the male line. Finally it is also patronymic, as it is known after the name of the male head (Sharma, 1982).

The inheritance rules of Meos are also strictly patrilineal. Land is equally divided between the sons. Widows have no share in ancestral property. Daughters and sisters have no right of inheritance in property. Daughters may receive a gift of land in the absence of any male heir. The customary laws of inheritance rather than *Shariat* prevail among the Meos (Marwah, 1979). The customary inheritance laws of the Meos seem to be closer to traditional Hindu laws than those based on the *Shariat* (Marwah, 19979). Women among Non-Meo Hindu communities also do not get a share of their father's property, although after the passage of the Hindu Succession Act, Hindu women have been made legal co-sharers in family property

The paramount considerations governing family behaviour among the Meos are: kin position, age and sex. The elder kin commands respect and seniority in age deserves deference. In the event of a clash between age and kin considerations the latter takes precedence over the former. Next counts sex: males command greater regard than females. Clearly, kin-orientation is identifiable as the kernel of Meo social structure.

3.5.5 Religion

A remarkable religious fact about the Meos is their conversion to Islam. Partly owing to their allegedly forcible conversion and partly for reasons of their perennial confrontation with Muslim rule, the conversion of the Meos to Islam did not entail rejection of their previous religion altogether (Sharma, 1982). Rather, conversion of the Meos to Islam resulted in an amalgam of both Hindu and Muslim customs in their unique mode of living. This is distinctly borne out by the writings of some ethnographers

(Powlett, 1878: 200; Crooke, 1896: 487; Sharma and Srivastava, 1967: 73). They accepted Islam only to the extent of adopting the rites of male circumcision and burial of the dead. In all other spheres of their socio-religious life, Hindu practices continued as before.

Meo ritual structure has become more important since conversion to Islam. Known in the past for their ignorance about religion (Powlett, 1878: 201), the Meos are now aware of their religious affiliation to Islam. Although they revere Rama, Krishna and Arjun, the Hindu incarnations, the ultimate God to them is Allah. Their main life-cycle rituals are *khatna* (rite of circumcision), *nikah* (Muslim mode of solemnising weddings), and *dafan* (burial of the dead), all three Islamic in character. Hindu religious scriptures such as the Ramayana and the Mahabharata are going out of favour and the study of the *Koran* is gaining popularity. In Mewati villages one sees many new mosques with full time *mullahs* (Muslim religious preachers) and fairly respectable attendance, especially on Fridays. Numerous *madarsas* (Muslim religious schools) have sprung up where Arabic is taught and instruction is given in Muslim religious scripture. In the spheres of fasts, feasts and festivals Muslim festivals such as *Id* and *Barawafat* are steadily substituting for Hindu festivals, such as *Holi* and *Diwali*. The Meos of Haryana have been found very punctilious about offering *namaz* (prayer) and observing other religious practices (Sharma, 1982).

The force now driving the Meos to Islam is the *tablique* movement. Historically speaking the *tablique* movement was started about fifty years ago by Maulana Ilyas with a view to making Meos 'Pure Mussalmans' (genuine Muslims) (Amir-Ali, 1970). To begin with, Maulana Ilyas thought of conducting religious socialisation of the Meos by introducing *madarsas* - schools of Arabic education all over Mewat. With this end in view, he founded a religious school at Nuh in district Gurgaon and thereby succeeded to some extent in his mission. In due course, the *tablique* movement changed its strategy with the result that *tabliqui jamat* became effective agencies of Islamic proselytisation among the Meos (Sharma, 1982).

The *tabliqui jamat* is a band of volunteers who visit Meo villages to persuade the Meos to become conscientious Muslims. The preachings of these *jamat* have been of two types: those aiming at fostering Islamic religiosity among the Meos and those seeking to purge the Meo ethos of such ethnic traditions as might be at odds with Islam. Accordingly, some of their preachings have been prescriptive and others prohibitive. Some of their prominent prescriptive preachings are to offer *namaz*, observe *roza (fasting)*, read and recite the *Koran,* undertake *haj* (visiting Muslim holy place Mecca), and emulate the ways of Prophet Mohammad. The prohibitive preachings include the following: do not practise the *got* system, do not perform grave worship, do not celebrate non-Muslim festivals, do not indulge in ceremonial rejoicing accompanied by music and dance, do not allow women to move about in the community without *Purdah*, do not send children to secular schools, and neither charge nor pay interest on money (Sharma, 1982).

The effects of the *tablique* movement on the socio-religious life of the Meos can be summarised under two broad categories: religious and social. The religious effects are noticeable in the transformation of religious beliefs and practices of the Meos in favour of Islam. As has been discussed earlier, there is evidence to suggest a shift in the Meos' allegiance to Islam with the result that 'Islam mindedness' is seeping into the community.

The social effects of *tablique* emanate from its over-insistence that the Meos cast off their age-old ethnic traditions which might be discordant with Islam. But the recent attempts by the *tablique* to undermine Meos' ethnic identity by violating the norms of *got* or *pal* exogamy has been severely rebuffed. The Meos still strictly observe the norms of exogamy. What is more, this perceived threat to their ethnic identity turned many of the Meos against induced Islamisation. They reaffirmed their intense sense of community identification by issuing statements such as follows: *Meo to Meo hee rahego, mullah nahni banego* (Meo will ever remain a Meo and never become a Mullah), and *Meo kee rewaz to sabse alag hae* (Meos' tradition is unique).

As a concluding remark on the relationship between religion and social structure among the Meos, it may be observed that the religion gained prominence only after the riots of partition. Following the communal outburst of 1947 the Meos, who had been otherwise not very enthusiastic about Islam in spite of their conversion to it, took on an

Islamic religious identity. However, they were not prepared to surrender their ethnic identity to their religious identity, that is, to merge the Meo identity with a Muslim identity. In spite of *tablique* activities intended to make Meos perfect Muslims, the Meos have not merged their identity completely with the Muslim culture and thereby become extinct. They prefer to exist as Meos first and Muslims second, maintaining their distinct cultural and ethnic identity.

It is still the ethnic tradition rather than Islam which lends the community a keen sense of its cultural integrity and social identity. The Islamic influence can at best permeate only within the limits set by the structural format of the Meo community. The continuance of the exogamous practices among the Meos conclusively indicates that the Meos will retain their cultural identity and distinct social properties even in the face of continued activity by the *tablique* missionaries.

3.5.6 Dress

The dress of Meos distinguishes them from other tribes inhabiting Mewat. Men's dress consists of a loose *kurta* (long, collarless shirt), *tahbands* (a piece of cloth worn around the waist), and a turban called a *phainta* or *sapha*. They also have a *chadar* (sheet of cloth), usually placed on their shoulder, which is a legacy from the Hindu dress. A *lathi* (wooden rod) is indispensable for a Meo and almost a part of his dress. It adds dignity, as does the ubiquitous beard (Amir-Ali, 1970).

The Meo women wear *shalwar*-like, loose, coloured pyjamas, *kameez* (long shirt) with full sleeves reaching to their wrists and a scarf (called by different names, *dupatta* or *odhani* or *lugra*) on their heads. Like Hindu women they practise the *gunghat* (veiling the face), but the Meo women cover their face with a veil in their own way, distinct from that of Hindu women, and they do not cover themselves with a *burqa* as the Muslim women do. Until two decades ago, the Meo woman always carried a *khari* (a rectangular reed basket) on her head while going out to towns or to her parents' home. In this she would put her clothes, and grains to barter for fruit or sweets for her children. Now a tin box replaces the *khari*.

Thick but hollow silver rings and ornamental chains round the neck as well as silver bracelets round the arms are also characteristic of Meo women. From the dress and ornaments, a Meo male or female has a distinct appearance in comparison to people living in surrounding regions.

3.5.7 Economy

The Meos are primarily agriculturists and ninety percent of them depend, directly or indirectly, on agriculture for their living (Amir-Ali, 1970; Government of India, 1988). They are so hardworking, especially the women, that the community has established a reputation for being good cultivators. However, because of small landholdings per household, agriculture cannot be raised above the bare subsistence level. According to a recent socio-economic survey of Mewat (Government of India, 1988) nearly 87 percent of Meo peasants still do not use improved seeds because they cannot afford them. Those few who use the improved seeds borrow money at exorbitantly high rates of interest from the local *bania* (moneylender) because that can be a secret arrangement, while to borrow from the bank is to incur condemnation from *tablique* teachers[4]. The same is the case with the use of improved farm tools and fertilisers. Hence, very little is left to sell and the Meo have little opportunity to take advantage of the relatively high price level for agricultural commodities, which now prevails. Perhaps half the population subsists on the brink of bankruptcy and has to borrow each year and pay back with high interest at the next harvest. Neither agriculture nor domestic life can go on without such borrowing (Amir-Ali, 1970).

Animal husbandry, the traditional occupation of the Meos, continues to be their chief interest. It has been suggested that it is because the Meo man's heart is with the animals that he leaves the cultivation of the soil, except its tillage with the help of animals, to his womenfolk. Mewati bulls and Mewati buffaloes are famous all over

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[4] The *tablique* propagandists denounce the acceptance or payment of interest. This prevents poor Meos from joining co-operative societies, taking out insurance policies or making use of the officially launched institutional finances. If this proscription is carried to its logical conclusion, the Meos should not accept any Community Development loans because they will have to pay interest on such amounts and according to *tablique* teaching, this is a great sin. But as pointed out by Amir-Ali (1970) and Aggarwal (1971) their lives cannot continue without borrowing, so they borrow from local moneylenders at exorbitant rates of interest.

India, and every Meo village maintains at least one breeding bull. Cattle traders come from far off places to buy Meo cattle in the fairs held in the region. However, cattle breeding as a main occupation on any large scale hardly exists, and, like agriculture it is practised at the subsistence level. As a profession it is losing its former position.

The reasons for all-round decline in animal husbandry are reported to be mainly two. First, the diminution of pastures; and, second, the increasing ravages of animal diseases. The forests on the plains have long ago been cut down. Those that still exist in the hills are controlled by the Forest Department of the State Government and the forest guards either do not allow grazing at all or demand prohibitive levies even for grazing permitted by forest regulations. The traditional folk medicines and the arts of husbandry have declined and the Meos find it difficult to protect or cure their animals from illness. Veterinary dispensaries are few and far between. In short, animal husbandry as a means of prosperity for the Meos is more important as an emblem, a potentiality, and a promise than as a factor of present day existence.

3.5.8 Synthesis of Mewati culture

The region called Mewat is culturally homogeneous and this cultural homogeneity cuts across religious boundaries. This Mewati culture has the elements of caste endogamy and the *gotra* system, and its own distinct identity in terms of lifestyle, dialect, dress, denominational membership, agricultural practices, history and other cultural traits. The communities inhabiting this region have some differences but these differences merge to give Mewat a unique cultural identity.

As mentioned in Section 3.4 the Hindus, Refugees and Meos are the main ethnic groups inhabiting the Mewat region. These three groups make up the Mewati culture. Among these three the first is the major Non-Meo community. It has also been established in the previous section that the ethnic roots of the Meos lie in Hindu culture. Like the Non-Meo, the Meo women do not get share in the property of the father and child marriage is very common (Amir-Ali, 1970). Although the Meos became Muslims long ago, they continue many Hindu beliefs and cultural practices. The synthesis of Hinduism and Islam was the hallmark of the Meos' culture (Haye, 1969; Sharma, 1969, 1982; Amir-Ali, 1970; Aggarwal, 1971; Rathee, 1971a; Shamsh, 1983). Moreover, their conversion was only superficial and the Islamic influence was visible only in the life cycle rituals, whereas their structural elements remained more or less the same (Sharma, 1969). The popular saying *'Meo ka kya Musalman aur Jat ka kya Hindu'* (Meos are hardly Muslims and Jats are hardly Hindus), exemplifies the unique cultural homogenity in Mewat. Only such characteristics of Muslim culture have been absorbed by the Meos as fit into the rural life of Mewat. They are thus closer in feeling to the Hindus of the Mewat than to the Muslims of the rest of India (Amir-Ali, 1970). It is in this setting, that this thesis looks at Mewat as a region. Wherever I have observed marked differences between the communities, this is noted.

3.6 Profile of the study area

3.6.1 Village profile

As mentioned in Chapter Two, a total of six villages were surveyed for the present study. The name of the villages and their populations are given in Chapter Two. The Mewat survey included a village questionnaire to assess the availability of health, education, transport and other services in the villages. Information was obtained on the availability and accessibility of various educational and health facilities, the quality of roads that connect the villages to other places, and the distance to transport depots such as railway stations and bus stands in the nearest town. Information was also obtained on the existence of post offices and banks because these support services contribute to the quality of life in the village and can indicate the degree of isolation of the village.

Table 3.5 presents the number of the sampled villages according to the available amenities in them. Out of six, only three villages are located within five kilometres of the nearest town, and the other three are more than 10 kilometres from the nearest town. Two villages contain bus stands and the other four are within five kilometres of a bus stand; all villages are more than 10 km from the nearest railway station. This shows that the bus service is more accessible than railways for villages in Mewat.

The availability of education is very important for the improvement of health and family welfare. Women with a high school education tend to have fewer and healthier children than illiterate women. It is apparent from Table 3.5 that all sampled villages in Mewat have a primary school located within the village: however, no village has a middle or a high school. The median distance of villages from a secondary or higher secondary school is between four and seven kilometres. However, all higher secondary schools are co-educational and Meos hesitate to send their daughters to co-educational schools.

Table 3.5 Village profile: amenities available, Mewat, 1996

Amenities available	Shikarpur	Malakha	Salakha	Alduka	Bainsi	Udaka
Distance from the nearest town (km)	2	3	13	13	11	5
Distance from the nearest bus stand (km)	0[a]	<5	<5	0	<5	<5
Distance from the nearest primary school (km)	0	0	0	0	0	0
Distance from the nearest middle school (km)	<5	<5	5-9	5-9	5-9	<5
Distance from the nearest high school (km)	<5	<5	10+	5-9	5-9	<5
Distance from the nearest health facility (km)	<5	5-10	<5	<5	0	<5
Distance from the nearest post office (km)	<5	5-10	<5	<5	<5	5-10
Anganwadi centre	Yes	Yes	No	Yes	Yes	Yes
Electricity	Yes	Yes	Yes	Yes	Yes	Yes
Bank	No	No	No	No	No	No

Source: Mewat field data, 1996
Note: [a]Amenity is contained within the village.

The availability of health facilities, either within or close to a village, is critical to the health and well-being of mothers and children in rural areas. Table 3.5 presents the distance of sampled villages from the nearest health facility. Only one village has some form of health facility within it and four villages are within five kilometres of the nearest health facility. The distance is more than 10 kilometres in the case of one village. One village has both a health facility and a registered private practitioner. A Primary Health Subcentre (PHS) is located within five kilometres of one village.

Among all the villages, one village does not have an *Anganwadi* centre (a preschool childcare centre under the Integrated Child Development Scheme). Two villages have a post office and the other two villages are within five kilometres of a post office. All the sampled villages are electrified. In fact, all villages in Haryana State are electrified and Haryana was the first state in India to provide all villages with electricity and drinking water (IIPS, 1995a). None of the villages has a fair price shop or a bank.

Table 3.6 shows land use patterns in the surveyed villages. The total cultivable area ranges from 75 to 91 percent of the total area of each village. There is little cultivable wasteland. Most of the area suited to agriculture is cultivated, but there is large variation in the amount of irrigated area, ranging from 49 to 93 percent of the total cropped area. The villages with a high percentage of land under irrigation are those

Table 3.6 Village profile: areas under different types of land use

Land use	Shikarpur	Malakha	Salakha	Alduka	Bainsi	Udaka
Total area (hectares)	180.0	69.2	61.9	889.9	360.0	252.0
Total cultivable area as % of total area	83.3	75.4	88.7	90.8	86.9	85.2
Total cropped area as % of total area	82.2	73.7	88.7	89.2	86.9	84.5
Total area under irrigation as % of total cropped area	70.3	82.3	92.7	48.6	82.4	74.2
Cultivable waste land as % of total cultivable area	1.3	2.3	0.00	1.7	0.0	0.0
Area not available for cultivation as % of total area	16.7	25.6	11.3	9.2	13.1	14.8

Source: Government of Haryana (1993)

where tubewells with electricity are available, while areas without much irrigated land are those where the main sources of irrigation are either government canals or tubewells without electricity. Land in Mewat is fertile and wherever irrigation facilities are available there are good *kharif*[5] and *rabi*[6] crops. *Jowar*[7] is the dominant *kharif* crop and

[5] Crop harvested in the autumn.

wheat is the *rabi* crop. Beside this, *bajara*[8], barley, mustard, gram, peas and lentil are also grown.

3.6.2 Household and respondents' background

3.6.2.1 Household characteristics

Table 3.7 summarises the data on the following housing characteristics: electricity, source of drinking water, presence of toilet, type of house, presence of separate kitchen and bathroom, type of cooking fuel, place where refuse is disposed of, place where animals are kept. A large majority of households in Mewat have electricity. But fewer households in Mewat have electricity as compared to the State as a whole, and more Non-Meo than Meo households have electricity.

Source of drinking water and availability of toilets are important determinants of the health status of household members, particularly of children. For Mewat as a whole, 34 percent of households have piped water for drinking. As in the case of electricity, there are Meo and Non-Meo differences in the source of drinking water: the proportion of households with piped drinking water is 40 percent for Non-Meos but only 30 percent for Meos. Only 7 percent of households in Mewat have a toilet compared to 9 percent for rural Haryana as a whole. Again there are Meo and Non-Meo differences; 11 percent of Non-Meo but only 4 percent of Meo households have a toilet.

Biomass fuel (cowdung cakes and wood) is the most common fuel used for cooking in Mewat and in rural Haryana. In Mewat and rural Haryana as a whole around 95 percent of households rely on biomass fuel. But while 8 percent of Non-Meo households use cleaner fuels (kerosene, coal and gas), only 1 percent of Meo households use them.

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[6] Crop harvested in the spring.
[7] A kind of millet.
[8] A kind of millet.

Table 3.7 Percentage distribution of households by various housing characteristics in Mewat and rural Haryana

Characteristics	Meo	Non-Meo	Mewat	Rural Haryana
Electricity				
Yes	76.1 (194)	80.3 (122)	77.6 (316)	81.9
No	23.9 (61)	19.7 (30)	22.4 (91)	18.9
Source of drinking water				
Piped	30.2 (77)	40.1 (61)	33.9 (138)	41.7
Other	69.8 (178)	59.9 (91)	66.1 (269)	58.3
Presence of latrine				
Yes	4.3 (11)	11.2 (17)	6.9 (28)	9.2
No	95.7 (244)	88.8 (135)	93.1 (379)	90.8
Type of house				
Pukka (cemented)	18.0 (46)	28.9 (44)	22.1 (90)	24.4
Kachcha (Not cemented)	82.0 (209)	71.1 (108)	77.9 (317)	75.6
Persons per room				
≤3	41.5 (106)	52.6 (80)	45.7 (186)	57.2
>3	58.5 (149)	47.4 (72)	54.3 (221)	42.8
Presence of separate kitchen				
Yes	29.0 (74)	36.8 (56)	32.0 (130)	–
No	71.0 (181)	63.2 (96)	68.0 (277)	–
Presence of separate bathroom				
Yes	20.8 (53)	35.5 (54)	26.3 (107)	–
No	79.2 (202)	64.5 (98)	73.7 (300)	–
Type of cooking fuel				
Cleaner fuels (kerosene, coal, gas)	1.2 (3)	7.9 (12)	3.7 (15)	5.4
Biomass fuels (cowdung cakes, wood)	98.9 (252)	92.1 (140)	96.3 (392)	94.6
Refuse in courtyard				
No	18.8 (48)	52.0 (79)	31.2 (127)	–
Yes	81.2 (207)	48.0 (73)	68.8 (280)	–
Animals in the courtyard				
No	62.0 (158)	67.1 (102)	63.9 (260)	67.2
Yes	38.0 (97)	32.9 (50)	36.1 (147)	32.8
N	255	152	407	1946

Source: Mewat field data, 1996; IIPS (1993a)
Note: Figures in parentheses are total number of households.

Based on the material used for the construction of walls, roof and floor, a house in the Mewat survey is classified as either *kachcha* (roof, wall and floor made from mud, thatch, or other low quality materials or unburnt mud bricks), *pukka* (roof, walls and floor are made of fired bricks), or semi-*pukka* (mixed structure, made of both type of structure). However semi-*pukka* houses are included in the category of *kachch*a houses for analysis purpose. In Mewat, 22 percent of the households have *pukka* houses compared to 25 percent in rural Haryana. Again, the quality of housing is better among Non-Meos: more than one fourth of the Non-Meo houses are *pukka* whereas only 18 percent of Meo houses are *pukka.*

The Mewat survey also collected information on whether households keep refuse and animals inside the courtyard, since keeping refuse and animals inside the house may adversely affect the health of residents, particularly children. In Mewat as a whole, 31 percent of households do not put refuse inside the courtyard, but there are large differences between Meos and Non-Meos in the place for disposing of refuse. A little less than half of Non-Meo households, but more than three-quarters of the Meo households, put refuse in their courtyard. There are no major differences between Meos and Non-Meos in the place where animals are kept. In Mewat and in all of rural Haryana nearly one-third of the households keep their animals inside the courtyard.

Crowding may affect health as well as quality of life. The number of persons per room in the household is used as a measure of crowding. While in rural Haryana the majority of households (57%) have fewer than three persons per room, in Mewat only 46 percent of the households have fewer than three persons per room. More than half of total Non-Meo households have fewer than three persons per room, but only 41 percent of Meo households live in such conditions.

Table 3.8 contains a number of measures related to the socio-economic status of households: ownership of agricultural land, livestock and consumer durable goods. Overall 44 percent of households in Mewat and in rural Haryana are landless. Meo households are more likely to be landless than Non-Meo households, but they are more likely to have livestock than Non-Meo households. This may be because rearing animals is the Meos' traditional occupation. Eighty-three percent of households in Mewat and rural Haryana as a whole have livestock, but 80 percent of Non-Meo households have livestock.

The possession of consumer durable goods is another indicator of a household's socio-economic level, and these goods may also have other benefits. For example, having access to a radio or television may expose household members to innovative ideas; a refrigerator prolongs the wholesomeness of food; and a means of transport allows greater access to many services outside the local area. Table 3.8 shows that a clock or watch and a bicycle are common items in Mewat. Other consumer goods which households in Mewat are likely to own are a sewing machine, a radio and, to a lesser extent, a television. There are major differences between Meo and Non-Meo households in ownership of sewing machines, with Non-Meo households more likely to own a sewing machine than Meo households. This may be because in one of the villages dominated by Non-Meo there was a stitching, cutting and tailoring centre where many women go for training, and in the process often purchase their own machines.

Table 3.8 Percentage of households owning agricultural land, livestock and various consumer goods in Mewat and rural Haryana

Items owned	Meo	Non-Meo	Mewat	Rural Haryana
Agricultural land	52.0 (133)	61.2 (93)	55.5 (226)	56.6
Livestock	83.1 (212)	80.3 (122)	82.0 (334)	82.4
Consumer goods				
Sewing machine	35.7 (91)	52.0 (79)	41.8 (170)	48.5
Clock/watch	53.3 (136)	66.4 (101)	58.2 (237)	69.4
Radio	41.2 (105)	45.3 (69)	42.7 (174)	44.4
Television	19.2 (49)	25.6 (39)	21.6 (88)	27.6
Refrigerator	1.1 (3)	3.3 (5)	2.0 (8)	5.6
Bicycle	48.2 (123)	52.0 (79)	49.6 (202)	50.1
Motorcycle/ scooter	3.1 (8)	5.9 (9)	4.2 (17)	7.6
Car/ jeep	0.4 (1)	0.7 (1)	0.49 (2)	0.4
Tractor	0.8 (2)	3.3 (5)	1.7 (7)	8.7

Source: Mewat field data, 1996; IIPS (1995a)
Note: Figures in parentheses are total number of households.

3.6.2.2 Background characteristics of respondents

This section examines selected background characteristics of primary respondents (who were mothers). Table 3.9 shows several important characteristics of the respondents. Not even one quarter of all respondents in Mewat are literate, compared to 36 percent of respondents in Haryana as a whole. Non-Meo respondents are better educated than Meo respondents. Illiteracy among the Meo respondents is particularly high. Husbands are better educated than their spouses but the difference is larger between Mewat and all of rural Haryana. Only one-third of husbands in rural Haryana are illiterate, while in Mewat more than half are illiterate. Similarly, there are large differences between Meo and Non-Meo husbands. The proportion of husbands who are illiterate is 42 percent for Non-Meos but 68 percent for Meos.

Table 3.9 also shows the distribution of respondents by respondent's work status. In the Mewat survey, work includes any kind of job for which the woman is paid in cash or in kind. Two-thirds of the respondents in Mewat compared to 68 percent in all rural Haryana reported that they were not working. Meo women were less likely to work than Non-Meo women.

Table 3.9 Percentage distribution of respondents by various background characteristics in Mewat and rural Haryana

Characteristics	Meo	Non-Meo	Mewat	Rural Haryana
Education				
Literate	19.2 (54)	30.1 (50)	23.3 (104)	36.0
Illiterate	80.8 (227)	71.9 (116)	76.7 (343)	74.0
Husband's education				
Literate	32.4 (91)	57.8 (96)	41.8 (187)	66.4
Illiterate	67.6 (190)	42.2 (70)	58.2 (260)	33.4
Employment status				
Yes	20.3 (57)	33.1 (55)	25.0 (112)	32.5
No	79.7 (224)	66.9 (111)	75.0 (335)	67.5
Type of family				
Joint/ extended	65.8 (185)	53.0 (88)	61.1 (274)	–
Nuclear	34.2 (96)	47.0 (78)	38.9 (174)	–

Source: Mewat field data 1996; IIPS (1995a)
Note: Figures in parentheses are total number of respondents.

3.7 Infant mortality in Mewat

In Mewat the death rites begin immediately after the death of a child. The grave is prepared in the family graveyard, which is usually a corner of a field near the village. A practising *faquir* is called to direct the preparation of the *mayyat* (corpse) for its last journey. The corpse is placed on a slanting wooden plank to purify it according to the Muslim custom. The old clothes are removed and a new white cloth is put on the child.

The Muslim *vazu* (ablutions) are carried out by washing the body with warm water containing leaves from the *neem* (margosa) tree and some *jafran* (saffron) or *muskdana* (the seeds of which emit fragrance like that of musk). The idea behind this is that worms or insects will not come near the buried body immediately because of the *jafran* or *muskdana* fragrance. The *vazu* takes the following order: the hands, the mouth, the nostrils, the face, the right and left arms up to the elbow, and the right and left feet. Finally the whole body is bathed. Generally the women do the washing of the baby and performing this action leads to earning *shabab* (merit or virtue). A close female relative of the dead baby pours water while another rubs the body with her right hand. The corpse is then wiped dry with a towel and then transferred to a bier on which two sheets of white cloth are spread. The body is then dressed in a white piece of cloth and a cap. Two sheets are folded over, first on the left and then on the right. The corpse is bound with three straps: one over the head, one around the waist, and the other near the feet. The third sheet is put over the body, covering it and the bier.

While repeating the *kalma* (confession of Mohammedanism), four male cousins or brothers of the dead baby lift the bier on to their shoulders and carry it to the graveyard. All the pall-bearers have their heads covered. On reaching the grave, the bier is laid beside it, and a sheet is spread on the ground for the *mullah* to stand on and lead the assembled people in prayer for the deceased. They take off their shoes and pray contrary to the usual Muslim practice of kneeling and bowing, standing on the shoes. The corpse is then placed in the grave with its face towards Mecca. An earthenware pitcher with water is put beside the corpse. The sheet, which was used as a covering and the one used by the *mullah* at prayer are given to the *faqir*[9]. Two stone slabs are put over the narrow part of the grave, covering the corpse, and the cracks are filled with wet mud. The brother of the deceased baby pours three fistfuls of loose earth over the stone slabs, and all other accompanying persons do likewise. Then the grave is filled with earth, which is heaped in a mound about twenty centimetres above the ground. The spade used for filling the grave with earth is referred to as *phainta mor*. It is passed lengthwise over the grave three times while someone pours water over it. The implements used for the burial are taken back to the place where the corpse was washed.

[9] Muslim caste of beggars.

Sometimes sweets and burning incense sticks are placed on the grave. For the first night the grave is left in the care of Mother Earth, and from the second till the seventh night a *faqir* has to sleep near it and guard it against wild animals.

After the burial the men that followed the corpse return home. Generally no one is to weep, otherwise it makes the journey of the soul of the deceased more difficult. However, women do wail, but are advised to be quiet. They are given *neem* leaves to chew so that the bitter taste may distract their attention. After coming back from the grave the men take baths. The clothes are given to the *faqir,* together with grains as payment for his services. Moreover, the *faquir* is fed with *roti* (bread) for ten days.

The death rites of the Non-Meos differs from those of the Meos. In the case of an adult death, the body is cremated and the ashes are consigned to water. However, burial of the body is practised when the deceased is a child. When the body is buried, there is no elaborate ceremony as happens in the case of cremation. This form of disposal is, in effect, a 'short cut' method and as such is reserved for those whose spirits are considered to be willing to abandon the pleasures of this world without elaborate persuasion. Children fall in this category because they have not yet known and enjoyed worldly pleasures. Among Non-Meos too, dead children are bathed, usually by women. After wiping dry, the baby is wrapped in a *kafan* (white cloth). Usually the father or any male member of the family lifts the baby to the shoulder and takes it to the burial place, which is different from the *shamshan ghat* (cremation place). Usually children are buried in the corner of a field. There are no after-burial ceremonies in the case of an infant death. Among Meos too there are not elaborate ceremonies in the case of a child death because it is believed that the soul of the deceased child will go to *jannat* (heaven) as it has committed no *gunah* (sins). Both Meos and Non-Meos consider children *masuum* (innocent).

3.7.1 Levels and differentials in infant mortality in Mewat

Table 3.10 shows infant mortality rates in Mewat, Haryana State and India as a whole. For Mewat, infant mortality is based on births between 1993 and 1995 (and not between 1993 and 1996 as in done in case of Cox regression) who have completed a one-year period. This is done in order to exclude censored cases. This table shows that while Haryana State is below the All India level of infant mortality, infant mortality is higher in Mewat region compared to India as well as Haryana State. In Haryana State there was a 23 percent decline in the infant mortality rate over a 10 year period (IIPS, 1995a). There are no infant mortality rates for Mewat for different periods. But the field data show that one in every ten children born in Mewat died within the first year of life between 1993 and 1995. Therefore, child survival programs still need to be intensified to reduce the level of infant mortality to the State level. People in Mewat delay naming newborn children because of the high infant mortality rate, and because the loss of a nameless child appears to be not so great as the loss of one who has a name (Aggarwal, 1971).

Table 3.10 Infant mortality rates in Mewat[a], Haryana State and India

Area	Infant mortality rate (IMR)
Mewat	91
Haryana State, 1995	68
India, 1995	74

Source: Mewat field data, 1996; Registrar General of India (1997)
[a] Note: The rates are per thousand live births that occurred between 1993-95.

Table 3.11 presents infant mortality rates according to various background characteristics in Mewat region and Haryana State. This table while confirming the same pattern for Mewat region and Haryana State, shows that the infant mortality rate in Mewat in different categories of variables is always higher in Mewat than in Haryana State, meaning that the benefits of development efforts have not reached Mewat.

Table 3.11 Infant mortality rates by selected characteristics in Mewat[a] and Haryana State, India

Background characteristics	Mewat	Haryana State
Maternal education		
Illiterate	101	87
Literate	63	63
Order of birth		
1	116	82
2-3	85	78
4+	84	75
Maternal age at birth		
<19	133	102
20-29	66	74
30+	65	67
Sex of the child		
Male	82	76
Female	103	83

Source: Mewat field data, 1996; IIPS (1995a)
[a] Note: The rates are per thousand live births that occurred between 1993 and 1995.

3.7.1.1 Demographic differentials in infant mortality in Mewat

Tables 3.11 and 3.12 present the differentials in infant mortality in Mewat by various demographic characteristics of mothers and children. The pattern of sex differentials provides evidence of differential treatment of male and female children leading to higher mortality risks for females. The expected U-shaped pattern in infant mortality with respect to order of birth and maternal age at the time of birth is not found in Mewat. Infant mortality appears to be highest for first-order births and for younger mothers (below 20 year of age at the time of childbirth), but declines with increases in birth order and mother's age. The steady decline in infant mortality with mother's age may reflect the experience gained over years of child bearing, making older mothers more capable of looking after their children.

Child spacing patterns have a powerful effect on the survival chances of children. Infant mortality risks increase sharply as the length of the preceding birth interval decreases. Infant mortality is around twice as high for children with a preceding birth interval of less than 24 months as for children with a preceding birth interval of 24 months or more (112 compared to 68 per 1000).

Table 3.12 Infant mortality rates by selected demographic, maternal health and cultural characteristics, Mewat, 1996

Background characteristics	Exposed births	Infant deaths	IMR
Preceding birth interval[a]			
<24 months	197	22	112
24+ months	322	22	68
Survival of previous child[a]			
Alive and 1st births	316	21	66
Dead	203	23	113
Place of delivery			
Hospital	108	7	65
Home	527	51	97
Assistance at delivery			
Professional (Doctor/ nurse/ANM/ LHV)	178	8	45
Traditional Birth Attendant (TBA)	457	50	109
Instrument for cutting the cord			
Scissors	261	15	57
Blade/ knife/ sickle	374	43	115
Ever breastfed			
Yes	616	53	86
No	19	5	263
Initiation of breastfeeding within 24 hours			
Yes	267	11	41
No and never breastfed	368	47	128
Utilisation of colostrum			
Yes	216	8	37
No and never breastfed	419	50	119

Source: Mewat field data, 1996
Note: The rates are per thousand live births that occurred between 1993-1995.
[a] Excluding first births

Survival of the previous child is another important determinant of infant mortality. Infant mortality is higher if the previous child died than when it is alive. This suggests that competition for resources is not the main mechanism for infant mortality in this case. Infant mortality is also lower when the birth takes place in a hospital compared to at home, when professionals assist at the delivery and when scissors are used in cutting the cord. Breastfeeding improves the nutritional status of the young children and reduces infant mortality. Infant mortality is three times as high when the baby is not breastfed as when it is and also when breastfeeding is not initiated within 24 hours of birth. Use of colostrum is a very important determinant of infant mortality as it increases the immune power of the baby. Infant mortality is three times as high when colostrum is not given to the baby as when it is.

3.7.1.2 Socio-economic differentials in infant mortality in Mewat

Table 3.13 shows infant mortality by selected socio-economic characteristics. Infant mortality declines sharply from illiterate mothers to literate mothers. Fathers' education also shows a similar pattern. There is no marked difference in infant mortality when the mother is working. This may be due to the type of work, as many working mothers are engaged in home based occupations like tailoring which are compatible with child care. Infant mortality is lower in joint families than in nuclear families. This may be due to the availability of more people to look after the children. Ownership of land and livestock are important factors affecting infant mortality, particularly in rural areas. Infant mortality is substantially lower among births to women who own land and livestock than those who do not own land and livestock.

Table 3.13 Infant mortality rates by selected socio-economic characteristics, Mewat, 1996

Background characteristics	Exposed births	Infant deaths	IMR
Maternal education			
Literate with some education	159	10	63
Illiterate	476	48	101
Paternal education			
Literate with some education	304	19	63
Illiterate	331	39	118
Mother currently working			
Yes	171	15	88
No	464	43	93
Father working as labourer			
No	324	19	59
Yes	311	39	130
Type of family			
Joint/ extended	260	16	61
Nuclear	375	42	112
Owning any land			
Yes	340	20	59
No	295	38	130
Owning any livestock			
Yes	511	42	82
No	124	16	103

Source: Mewat field data, 1996

Note: The rates are per thousand live births that occurred between 1993 and 1995.

3.7.1.3 Household environment factors in Infant mortality in Mewat

Table 3.14 presents differentials in infant mortality by various household environmental factors. Infant mortality is lower when the drinking water is piped rather than obtained from wells and natural resources. The presence of latrines is associated with higher infant mortality but in this case the sample size is very small as only seven births were to mothers who had a toilet facility in the house. Infant mortality is lower for children born to women living in *pukka* houses compared to *kachcha* houses.

Table 3.14 Infant mortality rates by selected environmental characteristics, Mewat, 1996

Background characteristics	Exposed births	Infant deaths	IMR
Availability of piped water supply			
Yes	197	10	51
No	438	48	110
Presence of latrines			
Yes	7	1	143
No	628	57	91
Type of house			
Pukka (cemented)	140	8	57
Kachcha (Not cemented)	495	50	101
Persons per room			
3 or less	292	12	41
More than 3	343	46	134
Presence of separate kitchen			
Yes	197	11	56
No	438	47	107
Presence of separate bathroom			
Yes	185	14	76
No	450	44	98
Type of cooking fuel			
Cleaner fuels (kerosene, coal, gas)	45	14	67
Biomass fuel (cowdung cakes, wood)	590	44	93
Refuse in courtyard			
No	438	30	68
Yes	197	28	142
Animals in the courtyard			
No	425	32	75
Yes	210	26	124

Source: Mewat field data, 1996

Note: The rates are per thousand live births that occurred between 1993 and 1995.

Crowding as measured by room density is an important determinant of infant mortality. Infant mortality is three times as high when the child is born to a crowded household (>3 persons per room). Separate kitchen, separate bathroom, and use of cleaner fuels are also associated with lower mortality. In Mewat, rooms which are used for cooking, living and sleeping may be a considerable health hazard and may produce higher mortality. Dumping refuse in the courtyard is a common practice in this area and is associated with higher infant mortality. Infant mortality is over two times as high when refuse is dumped in the courtyard than when it is not. Similarly the presence of animals in the courtyard is associated with higher infant mortality.

3.8 Summary

Mewat is a relatively backward region in comparison to Haryana State as a whole and to the Gurgaon District, which forms the major part of Mewat. Socio-economic and in particular educational backwardness has been highlighted. The study villages are characterised by lack of health, post and communication facilities and there are inadequate irrigation facilities. Infant mortality in Mewat and Haryana presents a similar pattern but the levels are higher in Mewat than in Haryana State as a whole.

CHAPTER FOUR

DEMOGRAPHIC, MATERNAL HEALTH AND CULTURAL DETERMINANTS OF INFANT MORTALITY IN MEWAT

4.1 Introduction

This chapter examines the effects of maternal reproductive behaviour and cultural factors on infant mortality in Mewat. The variables used fall into three broader categories: demographic, maternal health and cultural factors. The first group of variables consists of maternal reproductive characteristics (maternal fertility factors) which are specific to each child and are sometimes referred to as biodemographic factors. They constitute one component of the proximate determinants in the Mosley and Chen (1984) framework as discussed in Chapter One. Maternal health service utilisation factors cover matters related to childbirth; variables related to culture affect breastfeeding. A detailed description of the variables used is given in Section 4.3. This chapter begins with a description of some events which affect the variables used, including marriage, pregnancy, childbirth, infancy, and perceptions about illness and treatment. This is followed by the presentation and discussion of results. Since the sample size is small, it is not possible to draw firm conclusions. Hence, the causal mechanisms often have to be surmised.

4.2 Marriage, pregnancy, childbirth and infancy

4.2.1 Marriage

In Mewat, marriage is considered essential for both males and females, and age at marriage is particularly low. Meo boys marry between 12 and 18 years of age, and since wives should be younger than their husbands, most girls marry between the ages of 9 and 15. Non-Meos girls also marry early, but they wait at least until puberty. Most marriages both among Meos and Non-Meos are celebrated before 18 years of age, which is the legal age at marriage for females in India. As Amir-Ali (1970) says, 'girls are married young in Mewat as in the rest of rural India. This too is a safeguard against sexual laxity- before a woman has reached her prime she is already a mother to be classed among the matrons rather than among the young women'. The main reasons why parents marry off their daughters at an early age are to conform to tradition, and to preserve the chastity of daughters.

To conform to tradition. People in the study villages still followed traditional values and married off their daughters before or soon after they had attained puberty. They believed that the father would be committing a grave sin if he did not do so. One father said 'society will condemn us if our daughters are not married off before 15 years of age. People will say that the father must be earning from his young daughters'. A mother of a 16-year-old Non-Meo girl said:

> When I was her age I became the mother of a child. She should have been married by now but it is difficult to get good boys these days. By the grace of God we will marry her by next year, otherwise she will miss her marriageable age and once that age has gone nobody will marry her. It all depends on God and a good crop. For us farmers the crop is most important' (Field Notes, Mewat, 1996).

This feeling derives from ancient Hindu mythology according to which a girl should be married before she attains puberty and not later than after the first menstruation. The Indian marriage law, which forbids the marriage of girls before the age of 18 years, gets little support in rural Mewat; the majority of the people are not even aware of the law.

To preserve the chastity of the daughters. Parents are concerned about their daughters' chastity and marry them off early in order to safeguard them from sexual exploitation. Many women expressed fears of exploitation, but they were unable to cite any case of sexual exploitation when asked to give concrete examples. It is highly possible that they hide or avoid discussion of this issue.

4.2.2 Pregnancy

An early age at marriage leads to an early age at childbirth because the main function of the *berbani* (wife/woman) is to bear children for her husband's family, and her status grows with the birth of children, especially males (Aggarwal, 1971: 132). A woman's affiliation with her husband's family is strengthened when she bears a son. Then she becomes 'the mother of so-and–so'. Bearing and raising children are considered normal functions after marriage, and fertile women generally avoid going near a childless woman because they believe that she will work some *totaka* (charm) on their children. Sons are greatly preferred to daughters. Evidence of this preference is demonstrated dramatically at birth with elaborate birth ceremonies usually held for sons only (See Section 4.4.1.1).

Pregnant women continue doing all of their regular work. Even though they know that a certain amount of rest during pregnancy is desirable, in reality only a few fortunate women get the required rest. Most continue to do hard work until the labour pains start. The men are discouraged from sexual intercourse with their wives at about six months of pregnancy. A large proportion of women in Mewat do not visit antenatal clinics for a checkup, and do not receive two doses of anti-tetanus vaccine or iron and folic acid tablets during pregnancy. Some women reported a craving for mud during pregnancy, and some eat mud or clay at this time. They also have a number of dietary restrictions. For example, they are advised not to eat hot food like dates, dried fruit, and mangoes because consumption of these food items may abort the foetus. They also have a cultural belief that the kind of food taken affects the appearance of the child. Foods like spinach and egg-plant are thought to darken the complexion of the child whereas milk and raw coconut make the baby fair. Consuming a lot of milk and *ghee* is recommended to ease the birth of the baby. It is a usual practice to give some concoction of *ghee* and milk to the mother just before delivery. The rationale is that *ghee*, being greasy, easily slips the baby out with less pain. However, if the child dies during the course of delivery despite taking milk with *ghee*, it is considered the 'will of God'.

Certain beliefs and associated behaviour are also observed by the pregnant woman; for example, she is usually advised to avoid women who are known to be infertile or who always give birth to dead children because the *saya* (shadow) of such women will bring the same fate to the pregnant woman. This attitude is reflective of the *tel chadana* ceremony held the day of a girl's wedding when only married women who have borne children are asked to put henna and oil on the body of the bride for her successful wedding. Another belief is directly related to the appearance of a lunar or solar eclipse. During the time of the eclipse, a pregnant woman is required to stay indoors. Inside the home she occupies herself with household chores which do not involve using scissors or a knife or anything sharp and pointed, not even stitching with a needle. If she uses a sharp instrument, it is believed she will bear a deformed child, who will have a cut on the lip, ear, nose or other part of the face.

4.2.3 Childbirth

4.2.3.1 Village dais: a profile

Most of the women in the study area preferred to deliver babies at home assisted by a *dai,* of whom there is at least one in every village. I interviewed six *dais* in my study villages about delivery and postnatal dietary practices in Mewat. Since childbirth is considered to be unclean, birth attendance is traditionally considered the profession of untouchables or low caste women. The six *dais* I interviewed belonged to *bhnangi* (sweeper), *nai* (barber) and *julaha* (weaver) communities. These *dais* did not receive any formal training, but learned their skills by working with older women, usually their mothers-in-law. Thus the profession is considered a hereditary one. Four of them were in the age group of 40-49 years and two were in the age group of 35-39 years. They were all illiterate and had to their credit long years of experience varying from 10 to 30 years. They claimed that sizeable proportions of the villagers were born through their hands.

Although there was one government-trained *dai* in one of the study villages, most of the sample families did not prefer her because she refused to return after the birth to clean up the afterbirth. Rather she would bring an untouchable woman to cut the cord and clean up, thus burdening the family with paying two persons. The local *dais* on the other hand, besides delivering the baby, also cleaned up the afterbirth, massaged the mother soon after delivery, prepared herbal medicines for both mother and child and provided postnatal care for the first 10-15 days. In addition to the skills of delivery, these *dais* treated all kinds of abdominal troubles (*dharan*) and tonsillitis (*kag*), and also administered home medications for several ailments. They received for their services nominal amounts of money and discarded clothes worn by the women during the puerperal period. They receive more if the baby is a boy than if it is girl.

4.2.3.2 Place of birth: a description

When the labour starts, the mother retires to her room, and the family sends for a *dai* to help in the delivery. The family is often not very prompt about calling the *dai*. Some times the women do not seek any assistance and a female at home or friends living nearby deliver the child. At home the selection of a room for delivery rests with the mother-in-law. A room secluded from all possible avenues of light and air is generally chosen for childbirth. Most often the room selected is a storehouse, a dark room at the rear of the house. The selection of the room is purposive, as delivery is considered impure ceremonially and entry of air is prohibited as air and light are believed to be harmful for mother and child. If the family has only one room, a cloth curtain is put up to separate the mother and child from the others.

4.2.3.3 Delivery practices adopted by the dais

All six *dais* advise the women to bear pains in a standing posture until full dilation or as long as the woman has the physical capacity to bear down. After this, the woman is allowed to lie on a prepared floor or sit in the squatting position putting each foot on a brick so that she is somewhat elevated from the floor. Over the *kachcha* (earthen) floor dung cake ash is laid, which is covered by gunny bag or canvas. This arrangement is to the satisfaction of the *dais* as they state that cleansing of the products of labour and their disposal is possible to a considerable extent without spoiling any linen. Once the baby's head becomes visible, the temptation to apply abdominal pressure to enhance the uterine contraction is universal, and this was practised by all the *dais*.

The *dais* knew about the benefits of sterilisation and washing hands with soap, but only one boiled cord cutting implements or used soap to wash her hands. Hands were rinsed only with water by other *dais*. The cutting implements they used consisted of shaving blades, sickles, and knives. Only one *dai* tied the cord and the others left the cord stump alone. The cord and placenta were disposed of by all the *dais* by burying nearby, with a firm conviction that the child would remain alive after this act and it would ensure longevity. All these *dais* believed that if the cord and placenta were disposed of outside, animals might eat them and then the child would die. After the delivery, the mother is permitted to lie on a cot (c*harpay*) without clothes if the weather is warm, or covered by a blanket if it is cold.

Immediately after birth the new born is bathed with lukewarm water and after one to one and a half hours is given sugared water as its first meal, with the help of cotton wool or soft cloths dipped in the solution. This forms the pre-lacteal meal for the first 48 hours. The mother is bathed in warm water on the second or third day and this continues daily for ten days, and thereafter periodically depending upon the weather. During the postpartum period (particularly the first ten days) drinking or contacting cold water is avoided, as it is believed to lead to aches and pains in the body, wind formation and distension of the abdomen. Massaging the abdomen and legs with *ghee* or oil is continued for ten days or even longer.

The mother is supposed to spend 10 to 15 days within the confines of the delivery cell. The length of time that a woman is actually in confinement varies with her age, how she feels, and how many other women there are in the household to take over her tasks. The logic advanced for this kind of solitary confinement is that the mother and the child are susceptible to the evil eye and ghost intrusions, and confinement is considered to be effective to ward off these dangers. Avoiding contact with the outside air was believed to prevent hemiplegia, joint pains and disfunctioning of any part of the body. Besides, air contact is alleged to render the women b*ekari* (idle). An iron chain (s*angli*) is often placed around the cot, a shoe turned upside down near the foot of the bed or under it, iron materials such as a nail, key or knife may be placed underneath the pillow, and common salt and *rai* (mustardseed) sprinkled on the cot to ward off evil eyes and ghosts.

All physiological functions are performed in the cell during the period of confinement. Women defecate over ash or sand laid in a shallow pan. The *dai* comes daily during this period and helps in the cleaning of soiled material and the disposal of excreta and other waste material. She even washes the soiled clothes of the mother and the baby and cleans the premises. *Dai*s also bathe the mother and child and throw the unclean bath water some distance from the house. During this time the mother should remain in bed and not do any household work. She cannot start cooking until she stops bleeding because until then she is unclean. Usually the mother does not change her clothes during this time. At the end of her confinement she puts on new clothes, and her old clothes are given to the sweepers.

4.2.3.4 Dietary practices during the postnatal period

All *dais* emphasise a large intake of *ghee* after delivery. The mother is fed as much *ghee* as she can consume, and many of the women eat a great deal after their babies are born. Consumption of milk is avoided during the lying–in period, as it is firmly believed that milk becomes pus in the body. The mother consumes undiluted milk from the tenth day onward. After delivery, all foods which are thought to be cold (buttermilk, curd, sour food) are avoided and stress is laid on consumption of so-called hot foods such as *halwa* (made up of wheat flour, *ghee* and jaggery), and *goond ladoos* (balls of *ghee,* jaggery, gum acacia and flour). The intake of water by women is considerably reduced and at most only a spoonful of warm water is allowed. Water during the postpartum period is believed to lead to distension and flabbiness of the abdomen. *Dais* advise lactating mothers not to consume black gram, coarse cereals, lady fingers, eggplant, guava, *ber* (ziziphus) and banana, because of a strong belief that these foods lead to indigestion in the child through the mother's milk.

4.2.4 Infancy

In Mewat childbirth is considered impure but children are considered 'pure'. This means that they are holy. God resides in them, and they have committed no sin and cannot distinguish between good and evil. Children remain in this state of purity during infancy. The baby is not placed at the breast immediately after birth. It has to be initiated with a ceremony called *choochi dhona.* For this ceremony the mother's sister-in-law brings milk mixed with water in a small brass tray (*thali*) and a bunch of grass with which she washes the mother's nipples. The mother squeezes some of her first milk onto the *thali*. She may also throw some jewellery onto it.

From the time that the mother's breasts are ceremonially washed and she begins to nurse the baby, it is nursed on demand. Mother's milk is considered to be the best milk for the child. Some women believe that it is sufficient food for the infant, and no supplementary feeding is required. If the mother has no milk or insufficient milk, supplementary milk is given. Goat's milk, which can be purchased, is supposed to be best for this purpose, cows milk next best, and buffalo's milk considered least suitable. I did not find any mother who fed her child on powered milk. Supplementary milk is usually given by a spoon. Wet nursing is uncommon.

Reports as to the age at which supplementary feeding is started varied from six months to two years. My observations were that generally children were given some solid food regularly at about one year, such as a piece of bread (*roti*), but that very little solid food is given before this age. Some mothers believe that solid foods fed to nursing child cause dysentery. If the milk supply is not sufficient at this time, the mother feeds the child some cow's milk. Mothers who think that their milk provides sufficient nourishment may delay for up to two years before giving solid food.

Local perceptions about illness during infancy and treatment

During infancy babies are believed to be particularly susceptible to certain kinds of supernatural dangers. Sorcery committed by a barren woman by stealing the hair of a baby is quite common. Children, particularly young infants, are also susceptible to the effect of evil eye *(nazar),* especially if they are unusually handsome or healthy. Someone who is jealous puts *nazar* on a child. *Nazar* is also commonly invoked to explain sickness in young children who have eaten in the presence of a stranger. Hence mothers are advised that babies should be suckled in private. Illness resulting from *nazar* is said to affect children who develop crying, restlessness and loss of appetite. *Nazar* can be prevented by avoiding breastfeeding or feeding in public, putting a black spot on the child's face and by putting a *taveez* or other form of amulet on the child. Mothers of handsome children are warned that they should not dress the children well and make them look pretty lest they incite envy. One must never praise a child by saying that it is pretty or exceptionally big and healthy. Such praise may bring bad luck to the child and leave the praiser open to the suspicion of casting the evil eye. Beliefs about children's susceptibility to the evil eye varied. Some women were firmly convinced of the reality of this danger, whereas others believed that all illness was determined by the will of God. Some worried only about handsome children, and others feared for all children.

Nazar is removed by performing various rituals which include circling seven red chillies and some salt over the head of the sick child and then throwing them into the hearth, or burning chilli peppers in the presence of the child; this also serves for diagnosis, since if the child has *nazar* the normal pungent smell is absent. This practice is considered to be a way of removing (*utarna*) the problem, specifically by transferring or associating it with a substance, which is then disposed of. Or a red hot iron rod may be passed over the child; or the child's face may be reflected in a dish of oil then the oil is thrown away.

Another danger to children is ghost sickness. Ghosts may attack to children when they are sleeping and make them ill or may possess them, causing them to laugh, dance, and sing. A baby whose mother has died in childbirth is in great danger, since the ghost of the mother is apt to return and 'stick' to the child, causing illness or death. The family must then take the child to a *siana* (magical practitioner) who may determine why the ghost has bothered the child. He can drive out the ghost but is not able to predict the behaviour which the ghost causes. One mother said that she did not let her child go out after dark in the village because of the danger of ghosts.

One of the most common procedures employed for the treatment of sickness is *jhara,* 'sweeping', or *jharphuk*, 'sweeping and blowing', a practice found in most of northern India. Various forms of *jhara* were commonly sought in my fieldwork region to treat ailments in children ranging from toothache and boils, to typhoid-type prolonged fevers, snakebite and infant pneumonia. In *jhara* practised by local healers for specific ailments, an empowered mantra is recited inaudibly while downward-sweeping movements (usually with a fan of peacock feathers) are performed over the patient or the affected body parts but without contact. Such healers are always males and may be of any caste, although they are not drawn from the highest (Brahman) or lowest (Harijan) *jatis* (caste). Most healers in my fieldwork area were *gujar* and tended to have some religious role in their community, usually in the form of regular service at a temple or shrine.

Most other healing rituals employ some vehicle of transference through which the ailment is passed away from the sick person. For example different types of *totkya* (charm) may be used. This comprises various items arranged on a cowdung cake, which is circled over the patient and then placed by the healer at midday, dusk or midnight at a crossroads. In this kind of procedure the sickness is held to be removed by being transferred to the first person that accidentally touches the *totkya*. All married women were familiar with the ingredients of *totkya* and the general procedure.

The practice of worship of various gods and goddesses for preventing certain diseases is very common among people of Mewat. This is particularly true for diseases which are believed to be divinely controlled and can be cured by divine intervention or meditation. For example, the goddess *Mansa* is worshipped as a means of protection against snakebite, and the goddess *Shitala* is worshipped for protection against smallpox. 'Pox' diseases such as *choti mata* (measles) and *bari mata* (smallpox) are held by the villagers to arise from the internal heat produced by the wrath of the goddess *Sitla Màta* (Cool Mother). All the mothers in the villages where I conducted my survey worship this goddess annually at their homes to 'cool' and thereby please her so that, they say, she will protect their children. For the goddess's festival day (*Bassora)* all the food for each household is cooked the previous evening so that the hearth can be left unlit and cold. Despite their worship, the children may nevertheless get *choti mata* (though not *bari mata*, smallpox, which is recognised not to occur these days), but it will leave the body easily in a specific number of days and cause no permanent harm. Mothers generally concurred in asserting that failure to worship the goddess would result in her becoming angry and causing the children to become very ill, go blind, or be disfigured. Thus *mata* is predicted to be harmless if the goddess is worshipped.

The poor, and particularly Meos, when they cannot afford to pay for medicine or when they find a disease incurable, have recourse to such practices. In general, they do not consult medical doctors until they have tried a number of other remedies. Sometimes the villagers consult the physician, visit a *siana* and also simultaneously visit gods and goddesses and promise the deity something if the patient is cured. Offerings vary from sweets and flowers to a cloth sheet (*chadar udana*).

There was at least one spiritual healer from a Meo community in each of the surveyed villages. These spiritual healers are quite popular for treatment of illness among children. The spiritual healers chant *ayatha* (scriptures) from the *Koran* while holding a glass of water in both their hands in front of their face for some time, and then give this water to children at the time of illness. This therapy is applied for a period of two to three days. If the illness is not cured the spiritual healers advice to seek medical aid from hospitals. The strong belief in this therapy has contributed to high infant mortality among Meos.

4.3 Variables used

The variables used in this chapter fall into three broader groups: demographic, maternal health and cultural factors (Table 4.1). The categorisation of the independent variables is based on empirical findings from previous studies and their number across the sample. The convention of referring to the child in question as the index child is adopted.

4.3.1 Demographic factors

The demographic factors examined in this study are relatively conventional explanatory variables in the analysis of infant and child mortality. They include biological attributes of birth, for example, sex of the child, maternal age at birth, birth order, preceding birth interval and survival status of previous child.

Sex of the child is viewed as one of the proximate variables in the framework adopted in this study for studying infant mortality. Sex differences in infant mortality may reflect innate biological differences in infant viability, as well as sex differentials in the quality of infant care (Scrimshaw, 1978). The sex of the child can be an important determinant of mortality since male children tend to have higher mortality than female children except where there is a preference for male children (Madise and Diamond, 1995: 97).

Maternal age at birth is an important variable since in Mewat, where childbearing begins at an early age, higher infant mortality is expected for children of young mothers. Maternal age at birth was categorised as less than 20 years and 20 years or more. This variable is a proxy for the mother's physiological, mental and emotional maturity; it also measures the mother's experience with child care.

Birth order is the ordinal position in which the child was born in the family. Infant mortality was found to decline with an increase in birth order (Table 3.11), so it was divided into two categories, first births and second or higher order births. Parity is included since first-born children may be at greater risk because the mother's reproductive system is in the process of adapting to pregnancy and birth.

Table 4.1 Distribution of live births and infant deaths by categories of independent demographic, maternal health and cultural variables, Mewat, 1996

Variables	Live births	Infant deaths
Sex of the child		
Male	492(52)	42
Female	458 (48)	41
Maternal age at first marriage[a]		
< 18 Years	702 (74)	63
18 + years	245 (26)	20
Maternal age at childbirth		
< 20 years	361 (38)	48
20 + years	589 (62)	35
Birth order		
1st birth	218 (23)	26
2nd +	731 (77)	57
Preceding birth interval		
<24 months	296 (31)	41
24 + months & 1st births	654 (69)	42
Survival of previous child		
Alive & 1st births	657 (69)	46
Dead	293 (31)	37
Place of delivery		
Hospital	170 (18)	11
Home	780 (82)	72
Assistance at delivery		
Professional	298 (31)	15
Traditional birth attendant (*dai*)	652 (69)	68
Instrument for cutting the cord		
Scissors	402 (42)	23
Blade/ knife/ sickle	548 (58)	60
Ever breastfed[a]		
Yes	931 (98)	80
No	19 (2)	3
Initiation of breastfeeding within 24 hours		
Yes	409 (43)	17
No & never breastfed	541 (57)	66
Utilisation of colostrum		
Yes	333 (35)	12
No & never breastfed	617 (65)	71

Source: Mewat field data, 1996

Note: Figures in parenthesis are percentages.

[a] Not included in regression analysis.

The preceding birth interval is the interval before the birth of the child in question; so the effect of the preceding birth interval is considered in relation to the younger of the two children. Ideally, first births are left out of the analysis of preceding birth interval and survival of the preceding child because they are not preceded by another birth. Because of the small sample size, first births in this study have been merged with those with a preceding birth interval of 24 months or longer. Similarly, for the variable survival of the preceding child, where there was no preceding birth child were put in the same category as those whose preceding sibling was alive. Madise and Diamond (1995) used a similar approach in their analysis of these two variables. In this study, the preceding child was coded as being alive if it survived until its first birthday or until conception of the index child if this occurred earlier.

Birth intervals indicate the pace of childbearing. This variable was included to determine the behavioural mechanism that may be operating, because current evidence for the most frequently suggested mechanisms of maternal depletion, sibling competition, and increased infectious disease transmission is fragmentary and inconclusive (Boerma and Bicego, 1992). The survival status of the preceding child was included to capture the effects of intra-familial mortality. Biological, social and behavioural mechanisms may be operating in determining the survival status of the previous child and infant mortality, but these are not yet well understood (Winikoff, 1983).

4.3.2 Maternal health service utilisation factors

Variables examined in this group are place of delivery, assistance at delivery, and instrument for cutting the cord. Place of delivery is categorised into hospital and home. Assistance at delivery is classified into professional and traditional birth attendants (*dais*). A professional includes trained medical practitioners associated with a medical institution: doctor, nurse or Auxiliary Nurse Midwife. Traditional birth attendants are considered to be untrained. This category also includes relative, friends and other untrained persons who assisted in delivery. Table 4.1 shows that only 18 percent of Mewat deliveries occurred in medical institutions and only 31 percent of all births were attended by trained medical personnel. Instruments for cutting the cord have been categorised into (1) scissors and (2) blade, knife or sickle. Sandhya (1985) used a similar classification of instruments for cutting the cord.

Maternal health care variables are included because the health of the newly born child and its mother immediately before and after delivery is largely determined by the skill of the birth attendant, the sanitary conditions of the place of delivery, and the hygienic procedures followed during delivery. It is advantageous for the birth of the baby to take place under proper hygienic conditions with the assistance of a trained medical practitioner. At the time of delivery, the newborn and its mother are at a high risk of infection and of death if the birth environment is not hygienic and if proper care is not taken in cutting the cord.

4.3.3 Cultural factors

Initiation of breastfeeding within 24 hours and use of colostrum are the cultural variables used in this study. Table 4.1 also shows how soon after birth breastfeeding was initiated and whether colostrum was given to the baby. Although almost all children are breastfed, only 43 percent began breastfeeding within 24 hours of birth. Of children who were ever breastfed, 65 percent were not fed colostrum.

The early initiation of breastfeeding is important for infant survival. As soon as the infant starts sucking at the breast, the hormone oxytocin is released, resulting in uterine contractions which reduce the risk of postpartum haemorrhage and facilitate expulsion of the placenta (IIPS, 1995a: 177). Colostrum and breastmilk are sufficient for newborn infants; it is not necessary to feed them anything else. In fact, when the neonate is given anything else, contamination may cause infection, leading to diarrhoea. Moreover colostrum provides natural immunity for the child (IIPS, 1995a). Table 4.1 shows that breastfeeding is nearly universal in Mewat, with 98 percent of all children ever breastfed.

4.4 The results

4.4.1 The effects of demographic factors

This section examines the demographic determinants of infant mortality. Table 4.2 presents the univariate and multivariate results of fitting the proportional hazards model to the data for each of the five demographic variables. In general, the direction of hazard results is as expected. At univariate level, the effects of all variables except sex are statistically significant. Maternal age at birth, preceding birth interval and survival status of the previous child remained statistically significant after controlling for all other demographic, health service utilisation and cultural factors simultaneously.

4.4.1.1 Sex of the child

Mewati parents have a strong preference for sons which is reflected in higher female than male mortality. Table 4.2 shows higher female than male mortality for the first year of life, although the results are not statistically significant. The lack of significant sex differences in infant mortality may be because of small sample size but my field observations provide evidence of the practice of culturally-rooted preferential treatment of sons in Mewat as in other parts of North India, particularly Haryana State. However, preferential treatment may be reflected in gender differences in infant mortality. Both Meos and Non-Meos prefer sons. There is a definite preference for sons among Non-Meos who are basically Hindus; I believe that Meos also share this pattern. As described in Chapter Three, Meos continue most of the social and cultural practices of Hindus including a Mewati version of the son preference. The purpose of this section is to indicate the scale of differential treatment of sons and daughters which pervades the whole of Mewati society. Most of the information comes from field notes and observations. From birth a Mewati female is treated differently and this continues throughout her life.

Table 4.2 **Summary results from Cox proportional hazards model for the effect of demographic, maternal health and cultural factors on infant mortality, Mewat, 1996**

	Univariate			Multivariate		
Covariates	β	Exp(β)	SE	β	Exp(β)	SE
Sex of the child						
Male	0.0000	1.0000				
Female	0.2567	1.1225	0.2198			
Maternal age at childbirth						
20 + years	0.0000	1.0000		0.0000	1.0000	
<20 years	0.8371***	2.3097	0.2223	1.0177***	2.7667	0.2695
Birth order						
2nd +	0.0000	1.0000		0.0000	1.0000	
1st	0.4256*	1.5305	0.2367	0.4722	1.4212	0.2752
Preceding birth interval						
24 + months & 1st births	0.0000	1.0000		0.0000	1.0000	
<24 months	0.7940***	2.2122	0.2196	0.4722*	1.6036	0.2752
Survival of previous child						
Alive & 1st births	0.0000	1.0000		0.0000	1.0000	
Dead	0.6626***	1.9398	0.2203	0.9551***	2.5990	0.3228
Place of birth						
Hospital	0.0000	1.0000				
Home	0.3567	1.4286	0.3237			
Assistance at birth						
Professional	0.0000	1.0000		0.0000	1.0000	
Traditional	0.8107***	1.4286	0.3237	0.0382	1.0389	0.4371
Instrument used for cutting the cord						
Scissors	0.0000	1.0000		0.0000	1.0000	
Blade/knife/sickle	0.6700***	1.9542	0.2453	0.4694	1.5990	0.3497
Initiation of breastfeeding within 24 hours						
Yes	0.0000	1.0000		0.0000	1.0000	
No	1.1115*	3.0389	0.2720	0.5702	1.7686	0.4694
Utilisation of colostrum						
Yes	0.0000	1.0000		0.0000	1.0000	
No	1.1929*	3.2968	0.2931	0.4700*	1.6033	0.2749

Source: Mewat field data, 1996
Note: *p<0.10
**p<0.001
***p<0.000

Differential treatment at birth: evidence from birth ceremonies

The differential status of boys and girls is apparent from birth. The midwife's fee is lower when the newborn is a girl rather than a boy: usually she is paid two or three times as much for delivering a boy as for delivering a girl. The birth of a daughter is never announced through beating a brass plate, as is done to announce to the village the advent of a son in the family. The branch of a *neem* tree is tied over the door of the mother's room for good luck and to keep ghosts away in the case of a male birth which is regarded as a most auspicious occasion, and an event of great happiness and rejoicing. The birth of a girl is a quiet affair and I was told that in some cases people try to hide it. The women gather at night to sing special songs for a couple of days to celebrate the birth of a son. After the singing sessions, the parents distribute *gur* (jaggery) and *bankali* (boiled gram). This is usually avoided in case of female births, marking the inferiority of the female sex. The singing and dancing are repeated every day for ten days. Aggarwal (1971: 171) describes the birth of a male child among Meos:

> If a male baby is born, the midwife and the women assisting her sing a conventional song, which has the refrain '*Samar sahib ko nam, Sultani, tere put huo*' ("Remember the name of God, oh Sultani (mother's name), (since) you bore a son"). Some neighbouring women may also join in the singing. The midwife is given one extra rupee for delivering a male baby. On the second day following the birth and every day thereafter for three, five, seven, or twenty one days, the family invites the village women to sing songs in the late afternoon, and every day sweet food is distributed among the participants.

When a boy is born, particularly the first son, the mother's parents are informed by *bhelli le ke jana* (taking jaggery to the mother's parents' house). The father himself is expected to personally convey the message to his wife's parents by giving them a lump of brown sugar, but a cousin of his or even a *nai* (barber) or a *mirasi* (Muslim entertainer) may represent him. Messages are also sent to the child's father's sisters, each of whom is expected to bring a *kurta-topi* or *jholro-topi* (shirt and cap) for the baby. The mother's parents give a blanket and some money to the person that brings the message, and they inform him of the date when they expect to bring the *chhuchhak* (gift to a daughter at the birth of her son) which is usually presented within 42 days of delivery. The *chhuchhak* normally consists of clothes for the baby, the parents of the baby, the father's parents, the father's brothers and their wives and the father's sisters, and silver anklets for the baby. Apart from the gifts from the mother's parents, the newborn's father's sisters are presented with new clothes, silver and gold ornaments and some cash by the baby's parents. Sisters get far less in the case of a female birth. They may not even be invited and the mother's parents may not even be informed. Moreover the mother meets more favourable treatment if she delivers a son, but her own birth as a female was discriminated against.

Some big festivals, such as *Jasutan* among Non-Meos, and *Hafiko* are organised to rejoice over a newborn son. During these festivals Brahmans are fed, affinal or consanguineal relatives and friends are invited for food and sweets are distributed to other houses in the lineage. The guests may number 100 or more. But no comparable festivity is held for girls. These practices are symptomatic of a widespread preference for a male child among Mewati parents.

Differential treatment in health care and breastfeeding

Differential treatment of boys and girls is also evident in the care of children. Boys, particularly those who have been born after several years of barrenness or after the death of several children, are accorded more attention. Women who do have no sons do everything possible to have one but they make no special effort to have a daughter. Many women also expressed ideas about how boys could be conceived. Boys follow intercourse by moonlight, in the second half of the night, as by then the man has rested and is stronger; or on odd days after the end of menses. Mothers take special care of boys by keeping them away from a barren woman, because they believe that a barren woman may steal and bury the hair of a child and so kill the child and become pregnant. Greater concern for the safety of infant boys was apparent from my visit to the *Anganwadi* centre when it was a day for vaccination. Struck by the almost complete absence of girl children, I questioned four women who also had daughters but who had not had them vaccinated. The following response from one of those four mothers is an example of the relative lack of concern for the health of little girls:

> There is no need to care for the girls, not even in infancy. They are like *Kikar* (acacia, a thorny plant which grows without any care). Girls will grow up without any care just as the *Kikar* tree grows up without any care. But boys are like *Shisham* (a precious timber wood tree which needs special care to grow). Moreover, caring for a girl means caring for someone else's *baag* (garden) because she is a *Paraya Dhan* (other's property) and will go to others' house after marriage (Field Notes, Mewat, 1996).

Differential treatment for girls can be seen in the lack of prompt or prolonged treatment for girls. The Mewati families usually do not take daughters outside the village, whereas boys with prolonged illness may be taken to Gurgaon City. If they consult a trained medical professional for some illness, they expect quick results from medical treatment and will change doctors if the cure is not effective. With a girl, particularly if the family is poor, they will become discouraged sooner, and if she fails to recover, they may stop treating her. There were evident sex differentials in medical care during illness, which led to their death. Table 4.3 shows sex differentials in medical care: medical attention given to male children when they were sick was considerably greater than that given to female children. The table shows relative female deprivation in medical care and a large differential between boys and girls in medical attention received during illness.

Table 4.3 Percentage distribution of infant deaths by sex and type of medical attention at the time of death, Mewat, 1996

Type of medical attention	Males	Females
Trained medical practitioner	62.0 (26)	26.8 (11)
Others	14.2 (6)	36.6 (15)
No medical attention	23.8 (10)	36.6 (15)
Total	100.0 (42)	100.0 (41)

Source: Mewat field data, 1996
Note: Figures in parentheses are total number of infant deaths.

In Mewat almost all infants are breastfed. Informal talks with the mothers during the field survey indicated that in cases of insufficient breastmilk, male infants, even in low-income families received a regular supply of supplementary milk while female infants went without it. It was also brought out during discussion with mothers that when they have a daughter and wish for a son, they weaned the daughter sooner in order to conceive more quickly. NFHS data supports this finding in Haryana State:

> Boys are breastfed for a slightly longer period of time than girls in India as a whole. The duration of breastfeeding is much shorter for girls than for boys in Haryana, Rajasthan and Madhya Pradesh. One reason for the shorter period of breastfeeding for girls is the parents' desire to have another child sooner after the birth of a girl than after the birth of a boy, in the hope of having a boy for the next birth. Although the intent of parents may not always be to provide less adequate nutrition to daughters by weaning them earlier, the effect is the same (Rangamuthia *et al.*, 1997: 12).

Work, differential care and neglect

The productive labour in the courtyard and in the hills, and child care responsibilities, pose competing demands upon the time of Mewati women who are involved in full-time agriculture, livestock and household work. Thus working is a crucial factor in differential care as compared to mothers who remain at home. Under such circumstances, the care given to boys differs markedly from the care girls receive. After the birth of a daughter, the mother is denied the customary rest and she is expected to return to work immediately. Table 4.4 shows care of the newborn when the mother goes out for work. Table 4.4 shows that more daughters are left alone or with neighbours who are less able to attend to their needs. In contrast, sons simply will not be left alone, but will be attended to by mothers-in-law or elder siblings.

There are several sociological, cultural and economic explanations for son preference in Mewat. In Mewati society where marriage is exogamous, the residence pattern is patrilocal, and the family system is patrilineal, the man's role is central to the family and the society. In such societies, women's status is low and autonomy is negligible; therefore, they cannot participate as equals in decision making processes (Dyson and Moore, 1983). Das Gupta (1987) hypothesised that the strong underlying preference for sons in India appears to be the outcome of women's structural marginality in the culture. Daughters in Mewati society have no rights of asset ownership, and this severely restricts women from providing economic and other support to their parents.

Table 4.4 Percentage distribution of infants[a] by sex and type of care when mother goes out for work, Mewat, 1996

Type of care	Males	Females
Taken to the place of work	22.0 (23)	22.7 (32)
Neighbours	3.8 (4)	26.2 (37)
Elder siblings	28.5 (30)	14.9 (21)
Mother-in-law or some elder person in the family	45.7 (48)	31.9 (45)
Left alone	-	4.3 (6)
Total	100.0 (105)	100.0 (141)

Source: Mewat field data, 1996

Note: Figures in parentheses are total number of infants whose mothers were working.
[a]Excludes infant deaths.

The economic basis of gender preference in Mewat is the fact that sons own family property, including land, which is so dear to Mewatis, and boys provide economic security to their parents in old age. Since the society is patrilineal, they perpetuate the line of descent, and family status depends on leaving a surviving son. The authority of the head of the household is passed from father to son. Among Non-Meos a son is necessary for the performance of certain death rites at the pyre of his father. A girl, on the other hand, is always a financial liability. She requires an extensive dowry at the time of marriage, and she is committed to making gifts to her husband's household when she visits her parents for at least the first few years of their marriage. Although among Meos the girls' parents receive a substantial brideprice, throughout their lives the parents have to provide daughters with clothes and gifts for in-laws on numerous occasions without any reciprocity. Among Meos too, more outward happiness is expressed at the birth of a son.

There are also psychological reasons for son preference; men prefer sons because they regard having sons as a sign of masculinity, and sons provide men with greater companionship than daughters do. Sometimes, parents think that boys are easier to raise (Williamson, 1976). The most common reasons given by Non-Meo mothers for not preferring a girl child were that a girl is a liability or that a large sum of dowry is needed for her marriage. Various responses, both among Meos and Non-Meos, for preferring sons were: 'a son is quite necessary', 'a son is better than a daughter', 'sons carry the family name', 'wanted by others', 'feeling strong', 'old age security'. Based on evidence from my field research I believe that psychological and traditional reasons are more pronounced than economic reasons for son preference.

Although the main thrust of culture in Mewat is to favour sons, daughters are still valued in certain ways: for example, they are appreciated for their labour contribution. Their importance is immense on the occasions of *tota bandhana*[1], *ponchi bandhai*[2] and *kanya dan*.[3] These events explain the significance of a daughter. One sister among many brothers is considered lucky. In fact, while sons are preferred, some women desired a daughter if they had only sons. Asked whether they wished for a girl or a boy when pregnant, the women either expressed no preference, saying it was in the hands of God, or said that they wished for a boy. 'Even the ants need sons for the continuation of *vansh* (family)' said one Meo mother. Another said 'A couple can do without a daughter but not without a son. If a man does not have a son, there will be no one to take his name after his death'. These comments explain the preference for sons for the continuity of the family line and name among Meos, despite getting a bride price. Zhao (1997) also found in China that women indeed believed that 'more sons, more happiness and prosperity' but they also wanted to have a daughter or daughters after having a number of sons, to make their family 'perfect'.

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[1] *Tota bandhana* is performed at the time of house construction when the daughter or sister ties a *Tota,* a parrot made of cloth pieces or husk, at the main door of the house under construction; for this act, she is suitably rewarded in cash and kind.

[2] *Ponchi Bandhai* is done on the occasion of the *Rakshabandhan* festival when a sister ties a thread on the wrist of the brother; she is again suitably rewarded. To perform this rite, most married females visit their parental homes. Brothers without sisters miss this festival and wish that they could have at least one.

[3] It is believed among Non-Meos that if they do not marry out a daughter (*kanya dan*), their *dahli* (entrance of the house) will remain unmarried, which is considered bad and a cause of disappointment. Hence, they wish for a daughter whose marriage they can arrange.

4.4.1.2 Maternal age at birth

The results from univariate and multivariate analysis (Table 4.2) confirm the usual pattern of higher risks of infant mortality among children born to younger mothers. The results presented in Table 4.2 show that maternal age at birth had a significant gross and net effect on infant mortality in Mewat. At univariate level the relative risk of dying in infancy for children of mothers aged less than 20 years is 2.3 times as high as for infants of mothers aged 20 years or older.

Since maternal age and birth order are closely associated as lower order births are mainly to younger women, and higher order births are mainly to older women, birth order was taken into account. The results (Appendix 4.1) show that the effect of maternal age at birth on infant mortality was not altered when the birth order of the child was taken into account. However, there was moderate change in the mortality risk represented by relative risks. The relative risk of dying during infancy for children born to younger mothers increased from 2.3 to 2.7, compared to children born to mothers aged 20+ years when other demographic, health and cultural factors were controlled.

This suggests that very young mothers may not be physiologically and emotionally mature enough to adequately manage a pregnancy (Pebley and Stupp, 1987: 43). The increased risk of infant death to the younger mothers may be due to biological incompetence of early childbearing; for example, at younger maternal ages, the reproductive system has not matured sufficiently to produce strong, normal-weight babies (Madise and Diamond, 1995: 97). Young mothers may bear premature or low-birthweight infants because of poor nutritional status, inadequate use of antenatal care and lower educational achievements (Gribble, 1993: 139). In addition, most teenage mothers do not receive prenatal care (Trussell, 1988). They may also have poor child-care skills, partly because of inexperience in child rearing (Suchindran and Adlakha, 1981). Moreover, they may be unable to obtain an adequate share of food and other household resources for their children, since they may have little influence on the allocation of household resources (Ikamari, 1996).

4.4.1.3 Birth order

Although first-born children experience less competition for the family's resources, a first delivery may involve more complications. Previous studies have demonstrated that parity is related to birthweight, and among first births there is a higher incidence of low birthweight, which increases the risk of infection and mortality at early ages (Gribble, 1993: 133, 139). Second-order births tend to be heavier than first births, and third-order births also increased in birthweight, while births of a higher order show little or no increase.

Birth order is significantly related to infant mortality only in the univariate analysis. The results shown in Table 4.2 indicate that at the univariate level, the relative risk of dying during infancy was 1.5 times as high for first-order births as for second-or higher-order births. The results also show that the effect of birth order on infant mortality does not persist when other demographic, health and cultural factors are taken into account (Table 4.2). Since birth order is closely associated with maternal age, in that lower birth orders usually occur among young mothers, the effect of maternal age at birth was controlled in the analysis (Appendix 4.1). The relative risks of dying in infancy among firstborn children were no longer significantly different from those for the children of the second and third birth orders once maternal age at birth was taken into account.

These results are in contrast with studies which argue that both maternal age and birth order have independent influences on infant mortality (Cabrera, 1980; Gribble, 1993). Pebley and Stupp (1987) argue that irrespective of maternal age, firstborn children may be at a relatively high risk of dying as the reproductive system is in the process of adapting to pregnancy and childbirth. The Mewat study supports the earlier findings that the elevated risk of dying of first order births is mainly due to the fact that first-order births occur to women aged less than 20 (Trussell and Hammerslough, 1983; Gubhaju, 1985). In Mewat the mean age at marriage for females is low, so childbearing begins at a very early age: 60 percent of first births are to teenage mothers.

4.4.1.4 Preceding birth interval

The effect of the preceding birth interval was first analysed without controlling for the survival status of the preceding child at age one, and then with the control, to establish whether any relationship between the preceding birth interval and the mortality risk of the index child was influenced by the survival status of the preceding child. It has been argued that the effect of the preceding birth interval on the risk of mortality of the subsequent child without controls for the survival status of the preceding child is likely to be biased (Wolfers and Scrimshaw, 1975; Pebley and Millman, 1986: 71-72; Boerma and Bicego, 1992: 245-246) because birth intervals are shorter for women whose last child died than for those whose last child survived (Janowitz and Nichols, 1983). This may be largely attributed to the return of ovulation through the abrupt cessation of breastfeeding (Knodel, 1968; Adlakha, 1973; Brass and Barrett, 1978), but also to attempts by the parents to replace the dead child (Preston, 1978). The death of the index child could also be due to the same familial factors that caused the death of the elder sibling (Palloni and Millman, 1986: 217; Pebley and Stupp, 198: 43-47). So in the present study the survival status of the previous child was controlled in order to avoid the potential confounding effects of a child death on the length of a preceding birth interval.

Table 4.2 shows that the preceding birth interval was significantly and inversely associated with infant mortality at univariate as well as multivariate levels. The relative risk of dying during infancy for infants born with a preceding birth interval of less than 24 months was more than twice as high as the relative risk for firstborn infants and infants born with a preceding interval of 24 months or longer.

Table 4.2 also shows that this relationship was significant even when maternal age, birth order and survival status of the preceding child were controlled (net effect model), but the level of significance was reduced after controlling for the effects of other variables. This indicates that, irrespective of birth order, maternal age and survival status of the previous child, children born after a short birth interval were at greater risk of dying during infancy than children born at least 24 months after the preceding live birth.

Controlling for the effects of survival of the preceding sibling at age one reduced the relative risk of dying in infancy for short birth interval from 2.2 times (gross effect) to 1.9 (Appendix 4.2) as compared to longer birth interval. When other demographic, health and cultural variables were controlled for simultaneously (Table 4.2), the relative risk of dying for children preceded by short intervals (<24 months) was 1.6 times as high as for children preceded by intervals of 24+ months.

Thus the results show that the effect of the preceding birth interval on infant mortality remained highly significant even after the survival status of the preceding child was taken into account. Although there was a slight attenuation in its effect on infant mortality, the results indicate that, irrespective of the survival status of the preceding child, children born after short intervals were at a significantly greater risk of dying in infancy than children born after longer intervals. These results are consistent with the evidence from developing countries over the last two decades (Swenson, 1981; Hobcraft *et al,*. 1983: 593-610; 1985; Muganzi, 1984: 78; Cleland and Sathar, 1984: 406-414; Gubhaju, 1986; Palloni and Millman, 1986; Palloni and Tiende, 1986: 40-48; Palloni, 1989: 164-166; Gubhaju, Streatfield and Majumder 1991; Boerma and Bicego, 1992: 243-256; Majumder, May and Pant, 1997: 393).

Most studies of this issue vary considerably in their opinions of the mechanism by which the preceding birth interval affects infant mortality. It appears that in Mewat neither competition among siblings for household resources nor disease transmission was the main mechanism by which the preceding birth interval influenced child survival. Had it been so, controlling for the survival status of the preceding child would be expected to increase the effects of birth interval on child survival because the death of the previous sibling should remove, or at least reduce, the competition among siblings for maternal care and other household resources, such as food, health care and hygiene. Perhaps even better care may be provided to the index child because of the recent child loss because early child death reduces child-rearing responsibilities.

The results of the Cox's regression analysis show that the effects of the preceding birth interval on infant mortality persisted even after adjustment for the survival status of the preceding sibling. The persistence of mortality differentials by length of preceding birth interval, even when adjustments were made for the survival status of the previous sibling, provides evidence that the effects of a short preceding birth interval do not operate entirely through sibling competition (Cleland and Sathar, 1984: 409). The net effect of controlling for the survival status of the preceding child results in a reduction of the effect of the birth interval, which implies that shared family problems are stronger than sibling competition and disease transmission. Similarly the risk of mortality was higher when the preceding sibling had died in infancy than when it was alive (Table 4.2). These results suggest that shared biological or physiological factors affecting children with short preceding birth intervals were more important than sibling competition and disease transmission in the link between the preceding birth interval and infant survival.

It appears that the mortality risk attached to short birth interval derives mainly from maternal depletion syndrome. The suggestion of maternal depletion is also supported by Boerma and Bicego (1992: 245-246) who observed that if mortality risks between two successive children are correlated because of shared family problems, the effects of birth intervals on child survival would be reduced by controlling for the preceding child death. On the other hand, they argued that, if sibling competition is important, the potential effects of sibling competition and disease transmission are removed by the death of the preceding child, thus controlling for the survival status of the preceding child would be expected to increase the effects of birth interval on child survival. Finally, they argued that if the net effect of controlling for the survival status of the preceding child is a reduction of the effect of the birth interval, the implication is that shared family problems are stronger than sibling competition and disease transmission.

The results in this subsection show that longer birth intervals enhanced the chances of child survival. Shorter preceding birth intervals were associated with poor child survival prospects. Also the effect of the preceding birth interval on infant and child mortality persisted even after maternal age at birth, birth order, and the survival status of the preceding child were individually or simultaneously taken into account.

These findings are consistent with other studies, which have found a positive association between birth intervals and child survival. These consistencies serve to strengthen the conclusions reached by this study.

4.4.1.5 Survival of previous child

The results shown in Table 4.2 confirm that the survival status of the immediately preceding sibling was significantly related to infant mortality both in gross and net terms. Children whose immediately preceding sibling had died in infancy were at a significantly greater risk of dying in infancy than those children whose immediately preceding sibling survived infancy. In gross terms, a child whose preceding sibling had died in infancy was 1.9 times as likely to die in infancy as a child whose preceding sibling survived infancy.

The effect of the survival status of the preceding sibling on infant mortality was reduced from 2.2 in gross terms to 1.6 in net terms, when other demographic, health and cultural factors were simultaneously controlled for, although the effect of survival status of previous child was still significant and the risks of dying among children whose preceding sibling had died in infancy were still higher than among children whose preceding sibling had survived infancy. This suggests that survival status of the preceding sibling was itself an important determinant of infant mortality and a child whose immediately preceding sibling died in infancy is also more likely to die in infancy, irrespective of other demographic settings.

The pattern in which death of the preceding child is an important risk factor for infant death indicates a clustering of deaths within certain households. Cleland and Sathar (1984: 407) suggested that the survival of successive siblings early in life, which is influenced to a large extent by endogenous causes, might be correlated. This may be a result of biological conditions such as hereditary disease, birth trauma due to small pelvis or propensity to deliver prematurely. The evidence of intra-family correlation or clustering of deaths in certain families has also been noted in Bangladesh (Swenson, 1981; Majumder, 1980; Zenger, 1993; Alam, 1995), Nepal (Gubhaju, 1986; Gubhaju *et al.*, 1991; Pant, 1995), Indonesia (Hull and Gubhaju, 1986), India (Das Gupta, 1990), and Brazil (Curtis, Diamond and McDonald 1993; Sastry, 1997: 245-261). Das Gupta

(1990) observed that 12 percent of families in rural Punjab had multiple child losses, which constituted 60 percent of all child deaths in her data. Curtis *et al.* (1993) in their study in Brazil observed that 45 percent of all post-neonatal deaths were confined to only 2.5 percent of all the women interviewed.

The reasons for excess risk of mortality among infants preceded by a sibling who died in infancy could be both biological (Winikoff, 1982) and behavioural (Winikoff, 1983: 232; De Sweemer, 1984: 56-59; Pebley and Millman, 1986: 72; Hobcraft, 1987: 33; Das Gupta, 1990: 489; Boerma and Bicego, 1992: 245-246). Biological reasons include inherited genetic conditions such as sickle-cell anaemia or the tendency for some mothers to have low-birthweight or pre-term babies (Bakketeig, Hoffman and Harley, 1979). Some women experience more biological problems in pregnancy than others (for example, premature delivery, intrauterine growth retardation) and these problems are likely to be repeated in other pregnancies. Siblings also share the same home environment, family behaviour and child health practices and consequently also any risks associated with these (Curtis *et al.,* 1993). Das Gupta (1990) argues that clustering of deaths is largely a result of basic lack of ability in domestic management, irrespective of education, occupation or wealth of the families; some women are less resourceful and less well organised than others in caring for their children.

Overall, these results confirm that the survival status of the preceding child was significantly related to the mortality risk of the index child. The risk of death was greater when the preceding sibling was dead than when it was alive. Furthermore, the results show that its effect on infant mortality continued to be highly significant even after the preceding birth interval, maternal age at birth and birth order of the child were taken into account.

4.4.2 Maternal health service utilisation factors

This subsection examines the childbirth factors affecting infant mortality in Mewat. The care that a mother received during pregnancy and at the time of delivery is important for the survival and well-being of the new baby and herself. Table 4.2 shows that assistance at delivery and the instrument used for cutting the cord are the variables significantly associated with infant mortality at univariate level. There was a lower risk of dying in infancy among infants whose birth was assisted by a professional and whose umbilical cord was cut by scissors, compared to infants who were delivered by a *dai* and whose cord was cut by a blade, knife or sickle. Controlling for other demographic, maternal health utilisation and cultural factors make it insignificant. Place of delivery is found not to be significant even at univariate level.

4.4.2.1 Place of delivery

In Mewat a woman usually gives birth to a child in her husband's home, not in that of her parents, as in some parts of India. However, she usually takes the baby to her parents' home about a month after the child is born and stays there for two to three months. It is said that this trip is taken to avoid conceiving again too soon. Place of delivery is not significantly related with infant mortality although the signs of coefficients suggest that the risk of dying during infancy for infants born at home is almost one-and-a-half times that for infants born in hospitals. In Mewat women preferred to deliver at home in many situations. Only 18 percent of births took place in hospitals (Table 4.1). Trained attendants do not usually attend home deliveries, and usually untrained *dais* or relatives provide immediate help. In such situations, infection and unhygienic conditions are possible and proper antenatal and postnatal care and treatment are unlikely. It is obvious that infant mortality is high in those circumstances.

Informations from informal interviews with the Child Development Project Officer of Nuh block of Mewat, and with the mothers, suggest some factors in childbirth decision-making. In Mewati culture, pregnancy is considered a normal phenomenon. While hospitals are traditionally associated with sickness and death, pregnancy and childbirth are regularly expected processes for most women during part of their lifetime. Childbirth is therefore, a normal feature of womanhood; as one Meo woman puts it, 'pregnancy is a natural process and will end naturally'. But when a woman gives birth in a hospital, she is treated as a patient and she may have to stay alone in the maternity room with the nurse visiting now and then. She does not have the emotional support provided by the presence of her female relatives and friends during childbirth at home. These practices can be regarded as what Auerbach (1982: 1503) calls the *'emotional* *support/ humiliation-anxiety avoidance'* mechanism and may be the reason why women in Mewat prefer their own house to a hospital for delivery. One woman described the significance of this support system during childbirth:

> It is more important to have your mother with you during childbirth than a nurse. The familiar environment of home and presence of friends and family members reduces pain, strains and tensions of labour to a greater extent. It is said that your pain is halved if you share it and your happiness is doubled if you share it. It is humiliating to be in the presence of strangers during pain and it is bad to be alone with pain. Moreover, you feel shy to expose your genital area before strangers (Field Notes, Mewat, 1996).

Another factor in women's childbirth decision-making is the ability to continue supervision of household activities. According to custom, a woman is supposed to remain in bed for a week following childbirth, until the *chati* ceremony, which occurs when the baby is five or six days old. During this time her friends and relatives assist her to carry on her household responsibilities but she maintains a supervisory role. If a woman gives birth in the hospital she is removed from her normal routine and management of the household.

It appears that childbirth in the home provides for maximum individual and family control of the birth event, as well as ensuring a woman's privacy, and her ability to continue normal routines in a familiar environment. But when a woman enters a hospital for childbirth 'decision-making power and responsibility for her state pass from her to hospital personnel and the physician in charge' (Jordan, 1978). While the emotional support mechanism favours home delivery, the value of medical treatment favours hospital obstetrics. People in Mewat generally consider Western medical treatment highly effective. In the case of childbirth, however, socio-cultural factors, specifically those included in the emotional support mechanism, may override the value of medical treatment.

During my field visit to some of the Primary Health Centres, I had opportunities to meet mothers admitted for institutional deliveries and some of the relatives of the mothers at the Centre. I observed some genuine difficulties in carrying food from their home in distant villages, since no food was provided for in-patients at the Primary Health Centre. Relatives had to make temporary arrangements to cook food for the patients by staying somewhere near the Centre, since it was not possible to bring food daily from their villages. They found it difficult to make temporary arrangements until the new mothers were discharged. Because of this difficulty, patients were sometimes likely to be taken home early against medical advice. This may also be one of the important reasons for the reluctance of family members to take women for institutional deliveries.

4.4.2.2 Assistance at delivery

Assistance at delivery is significantly related with infant mortality only in the univariate analysis. Table 4.2 suggests that at the univariate level the relative risk of dying for babies delivered by *dais* was twice as high as for those delivered by medical professionals. The effect of assistance at delivery becomes insignificant when other demographic, maternal health and cultural factors are controlled simultaneously.

In Mewat untrained persons, including relatives, friends and traditional birth attendants, attend more than two-thirds of all deliveries. Since the majority of births take place at home, professionals including doctors, nurses and Auxiliary Nurse Midwives (ANM) assisted only 31 percent of deliveries. A large proportion of the women who use the services of the ANM or doctor are forced to seek help from trained medical personnel for complications arising during delivery. Why do the women in Mewat prefer *dais* to medical professionals?

The women prefer and trust the *dai* because they belong to the same socio-cultural milieu. They also use their services to conform with tradition and custom, despite the fact that the untrained birth attendants do not observe aseptic precautions for delivery or cord cutting. The confidence in the *dais* in Mewat results from the very convenient cultural milieu in which delivery takes place. They deliver babies in the homes of the mothers; relatives may assist in traditional births, but are excluded from hospital births. In hospital, the accompanying relatives will be informed of the estimated length of labour and told they can stay outside the labour room or leave the hospital. Unlike the hospitals, *dais* have emotional rapport with their patients and they treat patients as their children rather than as clients. The *dais* do not charge fees for their work. It is, however, customary for them to accept any courteous act of appreciation from the baby's parents like the gift of a piece of cloth or food. Some of the women narrated their personal experiences regarding pregnancy and delivery; Rukayia, a mother of six children said:

> Why should I go to hospital for delivery? I had six deliveries at home. My mother-in-law also had her twelve children at home. If it is your destiny to die, you will die even in hospital. I can tell you tens of examples when the women and the newborn died during delivery in hospital.

4.4.2.3 Instrument for cutting the cord

The instrument for cutting the cord is also significantly related with infant mortality only in the univariate analysis. At univariate level the relative risk of dying during infancy for children whose umbilical cord was cut with a blade, knife or sickle was 1.9 times as high as for those whose umbilical cord was cut with scissors. Controlling for other demographic, maternal health and cultural factors simultaneously reduced the effect of this variable and it became insignificant; but the relative risk of dying in infancy for children whose umbilical cord was cut with a blade, knife or sickle was still 1.5 times as high as for those whose umbilical cord was cut with scissors.

As mentioned in the previous section, in Mewat a majority of deliveries take place at home and are conducted by *dais*. Although *dai*s are supposed to use sterilised scissors to lessen the incidence of tetanus, they do not do so. Instead *dais* most commonly use sickles or unsterilised knives for cutting the umbilical cord; and they also do not boil the thread used for tying the cord.

4.4.3 The effects of cultural factors

4.4.3.1 Initiation of breastfeeding within 24 hours

Table 4.2 shows that initiation of breastfeeding had a significant gross effect on infant survival in Mewat. The relative risk of dying in infancy for children whose mothers initiated breastfeeding after 24 hours was three times as high as for infants of mothers who initiated breastfeeding within 24 hours. The strength of the effect of initiation of breastfeeding was reduced after controlling for other factors, and it became insignificant.

The practice of withholding breastmilk for the first three to five days after birth deprives the child of both nourishment and the vital substances present in the colostrum that facilitate development of the child's immune response system. The normal neonate can be put to the breast immediately after birth without any need for prelacteal feeds or supplements (Helsing and King, 1982), thus avoiding bacterial contamination (Ojofeitimi and Elegbe, 1982: 39). Also, early breastfeeding is found to result in less neonatal weight loss and to positively affect the duration of breastfeeding (Salariya, Easton and Cater, 1978: 1141; Taylor, Maloni and Brown, 1986: 151) and the bonding of the mother and child (de Chateau and Wiberg, 1977:145). Moreover, delay in initiating breastfeeding may also affect the quantity of breastmilk secreted because of the delay in receiving the stimulation normally provided by sucking. Obstacles preventing an early start may be hospital routines (Winikoff *et al.*, 1986: 357) and negative cultural perceptions about colostrum (Morse, Jehle and Gamble, 1990: 303).

In Mewat, virtually all women breastfeed their children (Table 4.2) but traditions and cultural taboos result in delayed breastfeeding, especially among mothers from the Meo community. Performing a traditional ceremony, lack of breastmilk and describing colostrum as bad milk were the most common reasons observed for delaying breastfeeding. At childbirth it is the custom to call the father's sister to wash the breasts of the delivered woman (*choochi dhona*) with milk before initiating breastfeeding. The presence of the father's sister is almost essential for the *choochi dhona* ritual. She is suitably rewarded for the performance of this ritual. She is presented with silver or gold ornaments and some cash, particularly if the newborn is a boy. Sometimes the sister-in-law clamours for a particular piece of expensive jewellery if the child is a boy, particularly a firstborn son, and her request is usually granted. She gets far less in case of a female birth. To perform this ritual, most of the married females visit their brother's place. In many cases the sister's place is far away from the place of birth. As this tradition is considered necessary before the beginning of breastfeeding, it may delay breastfeeding by one week or more. This tradition is followed even if the birth takes place in the hospital. If the husband does not have a sister, and another woman acts as a substitute, she receives only a nominal gift.

The advantages of immediately giving the newborn child the breast were not emphasised in the Nutrition and Health Education given to pregnant women. Even the women giving birth in hospitals tend to delay breastfeeding. Breastfeeding is one of the few health assets of Mewat, and this habit deserves all the support that it can get. This is so rooted in their culture that a boy who beats another in a fight may exclaim: 'you lost because you did not get your mother's milk!' Obviously, the importance of an early start to breastfeeding should be pointed out to the pregnant women of Mewat, and ways must be found to reach them.

4.4.3.2 Utilisation of colostrum

Though colostrum is an ideal food for the newborn, only 38 percent of the infants were given colostrum. Table 4.2 shows that utilisation of colostrum had a significant gross and net effect on infant survival in Mewat. The relative risk of dying in infancy for children whose mothers did not feed them colostrum was 3.2 times higher than those who were given it. The effect of utilisation of colostrum was reduced after controlling for other factors, though it still remained significant.

Colostrum, the first milk, is important to the newborn for its anti-infective properties (Ogra, Losonsky and Fishaut, 1983:82; Goldman, Goldblum and Hanson, 1990: 69; Ashraf, Jalif and Zaman, 1991: 488). In contrast to this positive, modern, medical view, Mewati culture considers colostrum to be of no value and even harmful to their newborns, and it is discarded. Colostrum taboos result in late initiation of breastfeeding, especially among Meo mothers.

In Mewat about 74 percent of the infants received their first milk on the third day after birth, which means that the infant was denied the benefits of colostrum. There is a belief that colostrum or the first milk has remained in the breast for nine months during pregnancy and is therefore harmful. There is also a religious belief that dropping milk on Mother Earth will ensure a continuous flow of milk; otherwise breastmilk will dry up. Colostrum was generally described as 'unpleasant', 'watery looking', 'unclean', ‘concentrated’, and of a red or yellow colour. The taste was considered bad and irritating for the newborn. They considered that colostrum was unsuitable for the newborn and that mother should delay breastfeeding for 3-4 days (longer for the primiparous) while waiting for the mature milk to come in. Colostrum should be discarded and prelacteal feeds or supplements given instead, preferably sugared water, diluted cow’s or goat’s milk or honey.

Negative ideas on colostrum are known in many societies past and present. Indian Brahminical medicine (‘Susruta’, second century B.C.) describes the custom of giving honey or clarified butter during the first four days of life whilst colostrum was discarded, and Soranus of Ephesus advised mothers to discard colostrum in his treatise on gynaecology and obstetrics in the second century (Wickes, 1953a: 151). The first writings in Western medical literature promoting the use of colostrum are from the seventeenth century (Wickes, 1953b: 332). Colostrum taboos can still be found in many cultures throughout the world. A study of ethnographic infant-feeding literature by Morse *et al.* (1990: 303) found that about two-fifths of 120 groups surveyed delayed breastfeeding for two or more days, considering colostrum poisonous, bad, provoking illness or ‘nothing’.

Why is colostrum so widely disliked? In Mewat, both colour and consistency seem to contribute. The women notice the difference in consistency and colour between the first milk and the ‘real’ milk that comes 2-5 days after birth. The fact that some colostrum is secreted in the last weeks of pregnancy may encourage the belief that it is an old and stale milk, and not suitable for the newborn. Since it is thick, it is believed that its removal would make suckling easy for the baby. Some mothers put the newborn to the breast immediately but that is definitely not the rule among women giving birth in rural Mewat. No particular value is attributed to starting breastfeeding right after the birth. The notion that breastfeeding should be started immediately seems to be new, a result of medical research. However, late initiation of breastfeeding coexists with prolonged lactation in the vast majority of cases. Prolonged breastfeeding was a regular feature observed among Mewati infants because it is the most convenient and economical way of feeding babies. The practice of prolonged lactation is commendable, but unfortunately it is often associated with delayed initiation of breastfeeding and rejection of colostrum.

4.5 Summary

The risk of mortality was found to be higher for female than for male infants. Though the results are not statistically significant, my field observations provide evidence of the practice of culturally rooted preferential treatment for sons in Mewat as in other parts of North India, particularly Haryana State. The preference for sons was clearly visible from elaborate birth ceremonies for sons and differential treatment in health care, breastfeeding and care of the newborn when the mother goes out to work.

The risk of infant mortality was highest among children born to mothers aged less than 20 years. Maternal age remained statistically significant in the multivariate analysis that incorporated all the other proximate variables (Table 4.2). Birth order was significantly related to infant mortality in univariate analysis. The risk of infant mortality was higher for first-order births, but after controlling for maternal age at birth the effect of birth order became insignificant. Thus these results indicate that the elevated risk of infant death among the first born was due to the fact that the majority were born to teenage mothers.

The analysis demonstrated the effects of birth interval on infant mortality. Short preceding birth intervals were associated with higher risk of dying during infancy in contrast to longer preceding birth intervals. The effect of the preceding birth interval on infant mortality was largely independent of all the proximate variables considered in this study.

This analysis showed the tendency of infant and child deaths to cluster in certain Mewatti families. Infants whose preceding siblings had died in infancy experienced a significantly greater risk of death than infants whose preceding siblings had survived infancy. The survival status of the preceding child was an important determinant of infant mortality with or without controls for preceding birth intervals, maternal age, and birth order. The results obtained imply that shared physiological, social, economic and environmental problems relating to mothers of children whose siblings had died in infancy were more important than sibling competition and disease transmission in the link between the survival status of the preceding child and the mortality risk of the index child.

None of the childbirth factors had a significant net effect on infant mortality in Mewat. Among cultural factors, utilisation of colostrum had a significant net effect on infant mortality. The relative risk of dying was significantly lower for infants who were fed colostrum.

The effects of demographic, health and cultural factors are not net of the influence of the socio-economic and environmental factors examined in this thesis. Therefore, further analysis of the effects of these proximate variables is presented in Chapter Six, where socio-economic and environmental factors were also incorporated in multivariate analysis of infant mortality.

CHAPTER FIVE

SOCIO-ECONOMIC DETERMINANTS OF INFANT MORTALITY IN MEWAT

5.1 Introduction

Several socio-economic factors have been found to be associated with infant and childhood mortality in the developing countries. These include parental education, place of residence (rural or urban), paternal occupation and dwelling characteristics. This chapter has three main purposes. The first is to examine the effects of each socio-economic factor in explaining differentials in infant mortality. The second is to investigate the extent to which each effects are altered when the other socio-economic factors are included as controls. The third is to assess the changes, if any, in the socio-economic factors on infant mortality when demographic, maternal health and cultural factors are also taken into account. The chapter begins with a description of the socio-economic environment in Mewat, followed by results, discussions and summary.

5.2 The social and economic environment

5.2.1 Children's education: to teach or not to teach?

Visits to government schools in Mewat will show a relative absence of Meo children compared to Non-Meo children. Education for Non-Meos means sending children to government schools and later colleges, but education for Meos in Mewat has two different connotations: (1) children going to government schools and colleges and passing out as matriculates or graduates; and (2) children going to a *maktab* or *madrasa* (religious schools) where they learn to read a little Urdu and a little more Arabic and thereby acquire the ability to recite a few verses of the *Koran*, the holy book of Islam.

With these two concepts of 'modern education' and 'religious education' the Meos are justified in wondering whether to teach or not to teach the boys and still more so the girls.

Official statistics published two decades ago by the Haryana and Rajasthan State Governments about the rate of 'drop-outs' at various stages of school education reveal that of every hundred Meo children in 1970 who entered primary school, more than 53 percent dropped out before completing the second standard. Barely 10 percent stayed on to study (not necessarily to pass) up to matriculation level. Only about 0.5 percent obtained a Bachelor of Arts degree. None attended the technical school (Rathee, 1971a). Even 24 years after the publication of these results, the situation has not improved. According to the Mewat Development Agency (1995b) the school dropout rates, particularly of female students, are still very high. This is because Meos do not attach much importance to education, since the community is less mobile than others and has become almost ambitionless (Rathee, 1971a). Amir-Ali (1970: 130) has described Meos 'as an essentially illiterate community'.

During my field survey if I came across a family which had children of school age but did not send them to school, I usually asked the mother why the children were not attending school. The most common reply was that the children could not be spared from housework and work in the field. The prevalence of joint families was another reason for not sending the children to school, since in joint families the elderly head makes any decisions including those concerning education. This prevents the parents from taking any decisions about their children's education. One Meo man explained his decision not to send his sons to schools:

> Ramdhan (my younger brother) sent all his three sons to school. But none of his sons could reach 8th standard. They all dropped out as '7th class failed'. Still they consider their meagre education sufficient to elevate them above the drudgery of having to work in their father's fields or walk behind a bullock plough. Ramdhan has lost control of his sons. If reprimanded, they just walk out and aimlessly loaf about with their friends in some nearby towns. They become easy targets for the purveyors of gambling, liquor, drugs, sex or crime. What did Ramdhan achieve by sending his sons to the school? If you ask me I will say 'Nothing'. I have four sons. I sent only my youngest son to the school so that he can have knowledge of court and law procedures. All my other sons are full time field hands. Since my youngest son who goes to the school, notices his brothers working in the field, he also comes to help during his off time. Thus I have

> the best of both worlds. I have one educated son in my family and also sons to help me in the field (Field Notes, Mewat, 1996).

Most men still believe that teaching a girl to read and write will only encourage her to write against her in-laws whenever her in-laws displease her. Furthermore, the men also believe that an educated girl will not cook and keep house and will become restless in the confinement of the courtyard. A father of two daughters commented:

> Teaching the girls? Are you joking? The boys stop going to the field if educated. The girls are likely to frown at cleaning the cows' barns or rubbing the utensils, if educated. Education will make them unfit for household work, which is necessary to run their families. Keeping her within the four walls of the house (*ghar ki chardivari*) can protect the girl's virtues. And who can give you a guarantee that she will not run away with someone and thus bring a bad name to the family? (Field Notes, Mewat, 1996).

On the other hand, there is gradually developing a body of opinion to the effect that both boys and girls should be educated. Although people may differ about sending their children to school, they all believe that education is associated with high status. The following excerpt from Amir-Ali's (1970) work provides an accurate description of how a Meo man aspires to high status after observing the high status granted to the *vakil* (lawyer) despite his young age:

> ...And yet, there is that young *vakil*. How humbly he himself had to behave before this young kinsman whose only qualification for superiority was his modern education. Should he not give his son also an opportunity to acquire that exalted position? (Amir-Ali, 1970: 87).

It is such contradictory contemplation that makes the question - to teach or not to teach - a painful one for the Meo father. Until recently his answer was a definite 'No'. Recently, as respondents indicate, he is beginning to say 'Why not?' and sometimes, 'Yes', but reluctantly. My interview with the village headman from one of the villages in Mewat was particularly very helpful in explaining Meos' aversion to 'modern education'. This village headman is a *vakil* and has his own practice in the court. He does not belong to the villages I surveyed; I met him during one of my initial visits to Mewat before I started my quantitative survey. I was accompanied by the *Anganwandi Worker* of that village, who lived in the town and travelled by bicycle to the village. The *Anganwadi* centre was located in one room of the village primary school. I was very impressed with the cleanliness and the facilities of the school building. The school had a spacious playground and separate rooms for all the classes from first to fifth; the rooms were well equipped with blackboards, and there was a handpump for a regular clean supply of drinking water. But I was disappointed to see that there was only one class and only one teacher present in the school. I was told by the AWW that the present headman of the village is an educated person and he is trying hard to get the children educated: it was he who raised the funds for the school building. I decided to meet the village headman and the AWW arranged a meeting at his residence on a weekend day, which was an off-day for the courts. Here is an excerpt from his comments on the general attitude of Meos towards school education of boys and girls:

> To answer this question first we have to understand the basic lifestyle and source of livelihood of the Meos and the importance of education within that sphere. A large section of the Meo population comprises agriculturists, labourers and animal rearers who until recently saw no benefit in sending their children to school.
>
> Second, education has not proved to be an asset to the Meos. Meo educated boys, even if they are graduates, find it difficult to find employment in a time when unemployment among the educated is so high and the competition for available jobs so high. When there are educated Meos without jobs, the value of such training may be called into question. Even when I emphasise educating children they openly ask me 'why waste money and time in giving our children modern education when they are not going to find a job?' And this feeling is shared by both the forward and backward looking Meos and their leaders.
>
> Third, the education of today produces frustrated half-educated youngsters who are now misfits both for town and village. Though the statistics may appear impressive the quality of education is deplorable. Even the 25% literacy in Mewat is a sad joke. Most of the degree or certificate holders from state schools and colleges are virtually uneducated. Their elders learned complex and difficult subjects like agriculture by an informal but organised system of learning. Though illiterate, many were surprisingly wise and educated. Their children, getting the worst of both worlds, may be literate but often uneducated (Field Notes, Mewat, 1996).

Amir-Ali (1970) observed the same phenomenon and made the following comments about Meos' aversion to 'modern education':

> Until very recently the Meos, being an agricultural community, did not regard formal education as a profitable proposition. The desire to teach boys enough to enable them to read religious books was, however, widespread. In other words, the Meos assumed that religious education stood for moral education and therefore set a value upon it as conducive for the better life. Since school education did not help to improve their living they had given it little value.
>
> The experience of the Meo boys leaving school after 1947 has been anything but pleasant. They used to find ready employment in the military and the police. But for many years after 1947 many young men who had passed out of the school loitered without employment and were problems to their households while they sought any job

that they could secure. This situation naturally chilled the enthusiasm of many a parent who had hoped that education for his son would bring him and his house-hold a release from the drudgery and uncertainties of the agricultural occupation. It made them prefer to keep their sons illiterate rather than spend money to provide them education that would make them unfit for life.

The result of this experience is that the little amount of school education still found among the Meos is restricted to the economically top-most members of the community. These families send their children to school on the calculated risk that even if it did not serve to secure for them an adequate return by way of employment and status the economic self-sufficiency of the family would not be much effected - education would be at least an ornament to their social prestige (Amir-Ali, 1970:88-89).

He adds about religious education:

Due to the impact of the *tablique jamaat* a section of the Meos has become inclined to send its boys to the *maktabs* or religious schools. But the outcome of this trend is equally frustrating. The products of these schools too have no other openings but to seek employment in other *maktabs* and there cannot be enough of these to absorb them all.

These young men can contribute little even to the moral and spiritual needs of the community. They, no doubt, offer their prayers regularly and in the appearance and daily conduct show that they conform to the fundamental rituals of religion. But it is difficult to establish their superiority over the illiterate Meos in the conduct of daily life" (Amir-Ali, 1970: 89-90)

During my field survey I also observed that *tablique jamaat* has successfully persuaded the Meos to send their children to *maktabs* and *madrasas* started by the *jamaat* in village mosques, staffed by the *maulvis* (Muslim religious teachers). Had the State Government been more imaginative, the Meo people could have been persuaded to send their children to modern educational institutions. For example, Urdu and Arabic teaching could have been included in the syllabuses of schools in Mewat.

Women's education is almost negligible and limited to primary level among the Meos. The Meos feel that a girl should be sent to school until grade five to enable her to write home and complain if she is unhappy in her husband's house. Many parents withdraw their girls from school after the fourth grade. Since they have usually learned to read and write by the end of the fourth year, the fifth year is often regarded as useless. This may have several reasons, like the unavailability of women teachers, particularly Meo women teachers, or separate schools for girls after primary level. Since a large section of the Meo population is illiterate, there is not much motivation to obtain higher female education. Also, there is a common belief in Mewat that girls have to mind their homes and there is no need for them to go to school. Girls are kept at home to look after the younger children and to help their mother with household work. Another factor contributing to this trend is the subjects taught in the schools themselves. As one mother puts it:

> In government schools only formal education is provided and that do not cover skill improvement for girls. The girls need stitching, knitting, embroidery, housekeeping, and hygiene for their future life. They could earn some money also if they had such traits (Field Notes, Mewat, 1996).

Notwithstanding that these factors deter the Meos from seeking education, I could sense during my field survey that the Meos are beginning to realise the importance of education and literacy - of course more for boys than for girls. Boys, (particularly the youngest one) are now normally sent to the school. In many cases the parents also agree to send their daughters to school provided that female teachers teach them. One of the factors contributing to this trend is provided by the Mewat Development Agency (MDA) and incentives given by the Haryana Government to promote female education in the region. The MDA provides free books, stationery, bags and a uniform to all school-going girls. The Haryana Government has announced free education for girls in Government schools and scholarships for girl students.

The result of all these efforts is that parents have started sending their children to school but still they do not make long-term plans for their children's education. I asked a number of mothers how long they wanted their children to attend school. By far the most common answer to this question was, 'It is in his fate, no matter what I want'. Even the *vakil* whom I interviewed said of his son's education, 'You can never know about the future, or what is going to happen. A man may have high ambitions, but only that is fulfilled which is in store for him and only when it is time for him. It all depends on his luck. He will not get more than his fate or before time. I may wish that my son will become a collector (the highest official in a district), but it is only that which is in his fate'.

Because of this attitude, attendance at school is far from regular. Illness, no matter how mild, is always an accepted excuse for non-attendance. I often found children playing vigorously in the streets who insisted they were too ill to attend school. Moreover there is no check on children to see whether they actually go to school once they leave the house. The headmaster of one of the boys schools I visited in Mewat told me that usually about 20 percent of the students are absent in the morning and about 40 percent in the afternoon. Even when parents do send their children to school, attendance is not regular. Parents may take their children out of school when their services are needed at home, for example during the harvesting season. Furthermore, if children do not want to attend school, they seldom are forced to go. In short, the children are rarely pressed to attend school, to get good grades or to study, which shows the casual attitude of parents towards academic achievement.

5.2.2 Division of labour in the household

There is a fairly clear division of labour among the members of a household. Boys help with the herding of grazing animals and girls do household chores and look after the younger siblings while the mother goes out to work in the fields. The women are responsible for all the housework including cooking, bringing water from the village well, cleaning the house, washing clothes and other domestic chores. Children are entirely their responsibility. Women also take sole responsibility for looking after domestic animals. This includes bringing fodder from the field, chaffing the fodder (although men sometimes help to chop the fodder), giving feed and water, cleaning cattle sheds, preparing cowdung cakes, preparing *bitora* (a heap of dried cowdung cakes), and making curd, butter and ghee.

Agricultural work, especially ploughing, is the men's domain. However, women help with the planting, weeding, harvesting, and other laborious operations. Men have sole charge of transport work involving the use of bullock carts and camels. They cart manure to the fields, crops to the threshing-ground and grain to the market town. The following excerpts from Amir-Ali (1970) well describe the imbalance in the division of labour between two sexes:

> Meo men are notorious for killing time in smoking their *huqqa*...
>
> The men of a household only engage in ploughing with bullocks and digging the soil when required. All the rest of the field work from sowing, weeding, harvesting, thrashing, winnowing to stacking- they leave to their women. Men do only a quarter of the work in the fields while the women do the remaining three fourths...
>
> To meet the calls of nature women have to rise before the veil of night is lifted and their men-folk have begun to move about. They are busy as long as the fading light of the sun allows them to be occupied. The women have to grind the corn, milk the cow or buffalo, prepare curds and whey, laboriously make the dough and prepare the piles of *chapaties* needed for sturdy men and hungry youngsters. They have to cut the fodder and feed the animals as well and, in addition to all this, they are expected to keep their house-holds, their kith and kin and their cattle sheds clean in a region where dust tends to settle incessantly. Sometimes they have even to prepare the *huqqa* for their lords and masters...
>
> Naturally, the women age prematurely- women who are no more than 25 looked as if they are 40. So fleeting is the bloom of youth that it is rarely to be seen (Amir-Ali, 1970: 59-60).

Meos owe more than any other tribe to the energy of their women. Some widowers even gave up farming because there was no woman in the household to look after the animals. Aggarwal (1971) has observed that caste groups living in Mewat are also influenced by Meo practices:

> The refugee Sikh men, who fed animals in the Punjab, are now influenced by the practices of the Meos. A Sikh woman complained: 'Our men have become lazy since coming here. They emulate the Meos and do not work as much as they used to. We women are worst hit. We have now to do twice as much work, while our men have more leisure' (Aggarwal, 1971: 90).

In short the women in Mewat have to work from early morning until late at night and they have spells of rest only when they visited their parents' homes. The result is that child care is not given much attention.

5.3 Variables used

The socio-economic variables used in the following analysis are education of mother, education of father, mother's work status, father's occupation, type of family, ownership of land, and ownership of livestock (Table 5.1). Education, especially of mothers, is important in health behaviour and health practices which have a great influence on the survival of young children. Since Caldwell's (1979) study in Nigeria many studies have demonstrated a strong association between maternal education and child survival at the household level; however, the nature of the relationship is not fully understood (Cochrane *et al.,* 1980; Cleland and van Ginneken, 1988; Bicego and Boerma, 1993).

In this study, level of education of mother is used as a measure of women's resources for nurturing their children. In Mewat, as noticed in Chapter Three, and earlier in this chapter, the educational level is very low. The majority only finishes primary education. Some do not have any formal education but they know how to read and write by going to mosques. It may not be worthwhile to take into account only level of education as a measure of women's resources in these circumstances, so in this study level of education and literacy were combined to form a category classified as literate which differentiates from illiterate. A similar approach was adopted for paternal education.

Mother's work status or occupation is also considered an important factor affecting infant and child mortality (Arriaga and Hobbs, 1982: 173; Hobcraft *et al.*, 1984: 196). The mother's work status determines the amount of time and care a mother can give to her child, and it may determine the amount of resources (income) available to the mother and thus her access to various goods and services. Women's work may also have an effect on child health through lack of time for breastfeeding. However, results obtained in studies conducted so far are mixed and appear to be inconclusive.

In this study, mother's work refers to whether or not the mother was in some form of employment at any time during the reference period, for which the woman was paid in cash or kind. Hence the variable has two categories, working and not working.

Ownership of land, and livestock and occupation of father determines the socio-economic status of the households in India (Sandhya, 1986: 95; IIPS, 1995a). But only a few previous studies have examined these variables, despite their pervasive influence on economic well-being in an agricultural economy (Driver, 1963; Smucker *et al.,* 1980; Frenzen and Hogan, 1982; Tuladhar and Stoeckel, 1983; Nagarajan, 1990:147; Casterline *et al.,* 1992). In this study amount of land owned, rather than amount cultivated is examined because land ownership reflects an important dimension of wealth, and thus permanent income, that may not be fully reflected in net income during one year (Casterline *et al.,* 1992: 250). Occupation of father was classified as working as labourer or not working as a labourer.

Table 5.1 Distribution of live births by categories of independent socio-economic variables, Mewat, 1996

Variables	Live births	Infant deaths
Education of mother		
Literate	248 (26)	12
Illiterate	702 (74)	71
Education of father		
Literate	455 (48)	29
Illiterate	495 (52)	54
Mother's work status		
No	680 (72)	59
Yes	270 (28)	24
Father working as labourer		
No	481 (49)	28
Yes	469 (51)	55
Type of family		
Joint/ extended	398 (42)	25
Nuclear	552 (58)	58
Owning any land		
Yes	518 (55)	31
No	432 (45)	52
Owning any livestock		
Yes	776 (82)	64
No	174 (18)	19
Total	950 (100)	83

Source: Mewat field data, 1996
Note: Figures in parenthesis are percentages to total live births.

The type of family will influence infant mortality indirectly through an effect on the life style, food habits, and decision when an infant falls sick to take it to the doctor (Sandhya, 1985, 111). In this study, type of family was categorised as joint/extended if other family members lived in the house and contributed to the expenses of the household, and nuclear if husband and wife lived on their own and not with the husband's family. Type of family was thought to affect infant mortality through the availability of other members of the family, besides the mother and father, to look after the children, especially when the mother went out to work.

Possession of livestock in Mewat can be important as regards child survival as it may provide nutritious food (milk). In addition, livestock can be a source of household income: animals or their products, for instance milk, can be sold to obtain cash with which to purchase food, other goods and services such as health services. Possession of livestock refers to whether or not there were cattle, sheep or goats in the household at the time of survey. No information was collected about the number or the specific type of livestock; nor was information collected about how long they had been reared.

5.4 Analytical approach

In this section, three proportional hazard regression models are fitted. As in the previous chapter, first, a univariate Cox's proportional hazard univariate regression model was fitted to examine the effect of each socio-economic variable on infant mortality (Model 1, Table 5.2). Second, a multivariate model was fitted to estimate the effects of each of these variables net of other socio-economic variables (Model 2, Table 5.3). The third model was also a multivariate model which was fitted to see the net effect of socio-economic, demographic and cultural factors affecting infant mortality (Model 3, Table 5. 4). The purpose was to see to what extent their relative importance varied when other socio-economic factors and demographic, maternal health and cultural factors were introduced as controls.

5.5 Results

A univariate proportional hazard model is presented in Table 5.2. It shows that variables significantly associated with infant mortality at the univariate level were education of mother, education of father, occupation of father, type of family and ownership of land. Table 5.3 presents the risk of infant death associated with each variable, controlling for other socio-economic variables. It appears from the analysis that none of the socio-economic factors except ownership of land and father's occupation had a significant influence on mortality during infancy in the multivariate model. Controls for the socio-economic factors reduced the significance level of the effect of ownership of land and father's occupation and also reduced the range of the coefficient.

Table 5.2 Summary results[a] from Cox proportional hazards model for the effect of socio-economic factors on infant mortality: Model 1 (Univariate model), Mewat, 1996

Covariates	Regression coefficient β	Exp (β)	SE	95% confidence interval
Education of mother				
Literate	0.0000	1.0000		
Illiterate	0.7580*	2.1340	0.3121	1.1575-3.934
Education of father				
Literate	0.0000	1.0000		
Illiterate	0.5602*	1.7510	0.2302	1.1151-2.7496
Mother's work status				
No	0.0000	1.0000		
Yes	0.0298	1.0302	0.2421	0.6410-1.6559
Father working as labourer				
No	0.0000	1.0000		
Yes	0.7146***	2.0435	0.2332	1.2964-3.2210
Type of family				
Joint/extended	0.0000	1.0000		
Nuclear	0.5416**	1.7187	0.2398	1.0753-2.7470
Owning any land				
Yes	0.0000	1.0000		
No	0.7242***	2.0631	0.2269	1.3224-3.2187
Owning any livestock				
Yes	0.0000	1.0000		
No	0.2962	1.3447	0.2613	0.8058-2.2440

Source: Mewat field data, 1996

Note: [a]Results based on a total of 950 cases: 83 died during infancy; 867 either survived the infancy period or were censored at survey date.

*p<0.10

**p<0.05

***p<0.01

5.5.1 Education of the parents

A little over three quarters of mothers and half the fathers in the sample were illiterate. Both maternal education and paternal education were significantly associated with reduced risk of infant mortality only at the univariate level. Table 5.2 shows that the relative risk of dying in infancy was twice as high if the mother was illiterate, and 1.75 times as high if the father was illiterate, compared with parents with some education. However, controlling for other socio-economic factors simultaneously reduced the strength of the effect of parental education and it became insignificant. Still the relative risk of dying in infancy for the infants of parents with no education was higher than that for infants born to parents with some education.

Table 5.3 Summary results[a] from Cox proportional hazards model for the effect of socio-economic factors on infant mortality: Model 2[b] (Multivariate model), Mewat, 1996

Covariates	Regression coefficient β	Exp (β)	SE	95% confidence interval
Education of mother				
Literate	0.0000	1.0000		
Illiterate	0.3637	1.4386	0.2833	0.8257- 2.5064
Education of father				
Literate	0.0000	1.0000		
Illiterate	0.0549	1.0564	0.2742	0.6173- 1.8079
Father working as labourer				
No	0.0000	1.0000		
Yes	0.4715*	1.6028	0.2342	0.9084- 2.4862
Type of family				
Joint/extended	0.0000	1.0000		
Nuclear	0.1887	1.2077	0.2698	0.7116- 2.0495
Owning any land				
Yes	0.0000	1.0000		
No	0.4352*	1.5453	0.2076	0.7435 - 3.2118

Source: Mewat field data, 1996.

Note: [a]Results based on a total of 950 cases: 83 died during infancy; 867 either survived the infancy period or were censored at survey date.
[b]Model contained all covariates listed in Table 5.2 that were significantly associated ($p<0.10$) with infant mortality.
*$P<0.10$

A few other studies have also shown insignificant net effects of parents' education on infant mortality. In a multivariate hazards model analysis of data from the Matlab Demographic Surveillance (DSS), Bangladesh, Phillips and Mozumder (1984) found almost no effect of socio-economic characteristics (including maternal education and household economic status) on infant mortality. No influence of maternal education on mortality during infancy was also found in another multivariate analysis based on data from the same Matlab area (Chowdhury, 1982). The absence of any influence of maternal education on mortality during infancy in Bangladesh is assumed to be related to the protection given by the almost universal and prolonged breastfeeding by Bangladeshi women (Phillips and Mozumder, 1984), coupled with low general levels of female education (Hobcraft *et a.l*, 1984: 220). To a certain extent this may account for the observed weak associations of socio-economic characteristics with infant mortality in the present study because, in Mewat, breastfeeding is similarly almost universal and prolonged.

There was no significant variation in infant survival probabilities according to maternal education, paternal status (education and occupation) in Egypt (Casterline *et al.*, 1989: 25). This finding applies with and without controls for household income and to infant and child mortality alike. However, although the estimated effects were not statistically significant, the coefficients indicate that mortality (especially early childhood mortality) does indeed decline with increased schooling, in particular if a level of seven or more years is attained. The lack of significance may be due to the relatively small number of cases analysed. Nevertheless, it is clear that the analysis was largely unsuccessful in identifying determinants of survival through early childhood, a period during which substantial effects would be expected from variables such as parental education, household sanitation and accessibility of health services (Casterline *et al.*, 1992: 257).

In a Thai study, maternal schooling did not have significant independent or joint effects upon infant survival, once other social variables were controlled (Frenzen and Hogan, 1982). Maternal education did not appear to increase the ability to provide adequate infant care, at least to the degree necessary to significantly reduce infant mortality independently of other social variables, including the health information provided by contact with a doctor, nurse or midwife. Maternal education did not have statistically significant effects upon infant survival independently of other social variables. But these findings should be qualified to some extent because of the relatively small size of the samples, which meant that infant mortality was a numerically rare event in the analysis reported here (Frenzen and Hogan, 1982).

A pattern of insignificant effect of parental education on infant mortality also emerges in some other North African and West Asian societies (see Adlakha and Suchindran, 1985). The results from other studies also conform in certain respects with those from other settings: the sharper effects in the early childhood period (Trussell and Hammerslough, 1983; Hobcraft *et al.*, 1984) and the emergence of effects when educational attainment exceeds the primary level (Anker and Knowles, 1980; Martin *et* *al.*, 1983). Considering the latter, one might argue that Mewat is a poor setting in which to test for maternal education effects because of low female school attendance levels.

Uribe (1989: 13) makes one specific proposal on the relationship between education and fertility and child mortality in rural areas. The proposal states that in general education does not have an important influence on the decline of fertility and mortality in rural areas. The explanations for this assertion are of two kinds: on the one hand, it is asserted that education does not have a major influence on fertility and child mortality because, in rural as opposed to urban environments, women are still restricted by traditional sex-role norms, and have less access to information and material on contraceptive methods (Kasarda, John and West, 1986). Similarly, Hobcraft *et al.* (1984) reached a conclusion that supports the view that, in rural areas, it is difficult to evaluate the effect of socio-economic variables (mother's education and her husband's occupation and education) on fertility and child mortality. According to these researchers, these socio-economic variables fail to distinguish the levels of mortality of groups with similar attributes; apparently the effects are confounded with those of 'differing child care practices and traditions, combined with differing levels of disease prevalence, medical and health care provisions and poverty' (Hobcraft *et al.*, 1984:822). Cleland and van Ginneken (1987) indirectly support this view that in rural areas it can be difficult to ascertain the effects of education on fertility and child mortality.

A significant inverse relationship between parental education and infant mortality could not be demonstrated in Mewat where a majority of people are illiterate: the literacy rate is 25.1 percent (Mewat Development Agency, 1995b). The absence of any significant influence of maternal education on mortality during infancy in Mewat may be due to the small sample size, or to the protection given by the almost universal and prolonged breastfeeding by Mewati women, coupled with general low levels of female education. As mentioned in Chapter Three, the female literacy rate in Mewat is only 10.2 percent (Mewat Development Agency, 1995b). As discussed in Section 5.2.1. the Meos see little benefit in educating their male children, much less in female education. A large section of the Meo population consists of agricultural labourers who see no advantage in sending their children to schools. One father said: 'Too much education will spoil the girls. They will not pick up cowdung, collect firewood or be obedient to their husbands.' On the question of educating his boys, he said: 'Why should I send them to school so that they can turn up their noses at the smell of cowdung or urine? By going to school they will be a misfit both for town and village. They won't get any benefits by learning a few *ingreji* (English) words' (Field Notes, Mewat, 1996).

Nevertheless, there is some reason to believe that education of mothers has positive effects on infant survival rates, even though their coefficients are not significant even at the 0.10 level. There is what Anker and Knowles (1989: 181) call a 'threshold' below which increases in education do not affect survival rates. This is particularly important in view of non-attendance at schools in Mewat. I believe that it is the level of education that makes a difference, not just any education. Although the completion of primary schooling is stressed in many discussions (e.g., Caldwell, 1979, 1986), that does not appear to be the important level in Mewat. In the present study the education variable was divided into 'some education' and 'no education' because only a very small percentage of women had five or more years of schooling. Under the prevailing conditions of low female literacy and when few women continue their studies beyond primary level, it seems that infant mortality is not affected by education of mother to an extent that could produce any significant differences in infant mortality between educated and uneducated mothers. The level of educational attainment will have to rise substantially beyond primary levels to achieve a noticeable impact on infant mortality in Mewat.

5.5.2 Mother's work status

Working mothers formed only 28 percent of the sample. Mother's work status is not significantly associated with infant mortality even at univariate level. The risk of dying in infancy among infants of mothers who were at the time of the survey in some form of paid employment was not significantly different from that of the infants born to mothers who were not in paid employment.

Although infants of working mothers experienced slightly higher mortality, this association is not significant. Much of the literature on the relationship between maternal employment and child survival implicitly focuses on the conflict between women's familial roles and their economic roles. It is argued that for mothers of young children, participation in income-generating activities diminishes the time available for child care, which in turn results in poor health and higher mortality for children (Farah and Preston, 1982: 372; Khan, Tamang and Patel, 1990; Basu and Basu, 1991: 96; Pant, 1995: 130-131).

Much of the concern regarding maternal employment is based on the notion that the mother is the natural caretaker for her young children. Hence, when the mother is employed, particularly when she works away from home, children are left either without a caretaker or in the care of other siblings or grandparents. These children may not be given appropriate food or may be more vulnerable to other health hazards such as accidents. This is particularly true when the alternative care provider is another child, such as an older sister (Engle, 1989).

Implicit in this argument is the assumption that mothers who are not involved in economic work are available for child care. By consistently emphasising the negative association between time spent caring for children and time spent in market work, investigators have largely ignored the nature and relevance of women's participation in domestic activities. Domestic labour consumes a tremendous portion of women's time in poor areas, affecting the care of their young children. Numerous studies in India and in other developing countries show that in addition to such typical domestic activities as cooking and cleaning, poor women spend a considerable time collecting firewood, preparing cowdung cakes, or cleaning grain (Jain, 1985; Jain and Banerjee, 1985; Agarwal, 1986). These activities are rarely considered economic, either by the national accounts system or by the women themselves (Jahan and Papanek, 1979). Although such activities are highly productive, they are usually called 'marginal economic activity' or 'expenditure-saving activity' (NSSO, 1980; Anker, Khan, and Gupta, 1988).

From actual time-use patterns in rural Karnataka, Desai and Jain (1994) found that regardless of their level of economic participation, most women spend a great deal of time in domestic activities that are not necessarily compatible with caring for their young children. There is a small decline in the time a mother spends in specific child care activities and a moderate increase in alternative child care with an increase in the mother's hours of economic work. These findings are similar to the results from two other Asian countries, the Philippines (Ho, 1979) and Malaysia (DaVanzo and Lee, 1983), which also show very little decline in the mother's time with children as her time in economic activity increases, although they do show substantial decline in mother's leisure time and sleep. Additionally, Desai and Jain (1994) found that regardless of whether mothers participate in paid work, children spend a substantial amount of time (3-4 hours per day) under the supervision of other adults or children. Thus, if exposure to alternative care poses any risk to children, such as increased infection or accidents, these risks exist regardless of mothers' involvement in economic activities, within or outside the home.

The studies from India (Sen, 1982; Desai and Jain, 1994) and from Bangladesh (Cain, Khan and Nahar, 1979), show that although women from families with large landholdings are less likely to work for wages or in petty business, their total workload is in fact heavier than that of landless women. Although they are not working in paid employment, much of their work is concentrated on the family farm instead of in wage labour. Detailed interviews with a few Mewat respondents suggest that both working and non-working mothers spend about the same amount of time on child care and even the 'non-working' mothers are also engaged in a variety of activities depending upon the availability of work and family's financial circumstances:

> Rehana, mother of four children, is not a working mother. Her youngest child is a boy who is two years old. Other children include a daughter aged three years, two sons five and seven years old. Her two elder children go to school. She is the first one in the house to get up in the morning, but the last one to go to bed. She gets up before the men-folk have began to move about. She goes to the field, generally with other women, to finish the first task of the day. After completing her toilet, she returns to the courtyard, washes and begins the day's work. She feeds the calf and churns the milk. Twice in a week she has to grind grain. By this time her mother-in-law gets up and she has to make *hukka* for her. Now it is the time to make breakfast. She fires the hearth to cook bread for the family members. By now the children start getting up from their beds. The men finish feeding and milking the cattle before they come into eat. She is the last to have her meal. After breakfast the men leave for the fields. During the morning she sweeps the floor, does the laundry, gets water from the village well and makes the dung cakes. When work in the field is light, the men come home to lunch; but if it is harvest or planting time, they prefer to have lunch carried out to them. In that case she has a long walk to the fields to carry the lunch. If there is no work in the field, she goes to the *pahar* (hill) to get fodder. After coming back home she cuts the fodder and feeds and waters the animals. By now it is the time to start preparing the evening meal. Around 8, the men come into the courtyard for their evening meal. Once again, her efforts are concentrated on serving food to the men. Only when the

> men have left does she eat her dinner. Gradually the children drift off to bed, to be joined later by their mother or an older sibling or cousin. One by one everybody goes to bed. But it is still not the time for her to go to bed. She responds to her husband's quiet call and goes silently to him. She is careful not to disturb other occupants of the room. Now it is night time to rest in order to meet the toil of a new day. But she stirs in response to the crying of her baby. *Bhagwan ne raat nehi banai hoti to kya hota?* (What would have happened if God had not created night?) asks Rehana (Field Notes, Mewat, 1996).

Apart from these daily domestic activities, she performs a variety of tasks that are sometimes referred to as marginally economic or expenditure saving tasks. These involve sowing, weeding, harvesting, threshing and winnowing. *Marden to khali khet joatata hai,* (Men do only ploughing and crushing) says Rehana, all the rest of the field work is done by her along with other female members of the household. She has no leisure time but the males either go to the *choupal* (community place) or to the *chai khokhas* (tea shops) of nearby towns and engage in gossiping, playing cards, discussing local politics and listening to the radio.

> Akmali, belonging to a lower economic stratum and mother of two children (a five-months-old and a one-and-a-half-year-old daughter), works as a full time wage labourer. Her husband works in the municipality. She has to play a dual role: a familial role as wife, mother and housewife and the other role as employee. She not only works for eight to ten hours at her work place, but on returning home she devotes another five to six hours to her domestic obligations including care of children. Obtaining essentials like drinking water and ration supplies[1] of cereals or kerosene is a time consuming process. The family needs at least two cooked meals and each time cooking is a long and time-consuming process. In the absence of any storing facilities and hand to mouth earnings, shopping for food is invariably a daily exercise. Thus for Akmali, household tasks constitute a full day's work. Since she does a full day's work for wages, it is natural for her to expect some help in the domestic chores from the family members. But neither her husband nor other family members share the household chores. Her two daughters are too young to help her with any work. Her husband sometimes undertakes outdoor activities like fetching vegetables, or groceries. The main reason for non-sharing of housework is a custom or tradition. Since it is customary for men not to engage in housework, those who render some help, undertake only those assignments which are considered less demeaning for them. In his free time her husband sits around, chatting, smoking or chewing betel while she is busy with cooking or other household activities (Field Notes, Mewat, 1996).

'All work and no play makes Jack a dull boy.' But both Rehana and Akmali are engaged in routine work and find no time for leisure. Both of them start work at 5 a.m. and work till 9 p.m., both inside and outside their homes. While Akmali takes her children to her workplace, Rehana leaves them with her mother-in-law. As far as caring

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[1] Supplies from fair-price shops.

for children is concerned, both spend time in specific activities such as feeding or bathing children. They watch children while performing other activities, but they do not spend time holding and playing with children.

Irrespective of women's level of participation in economic activity, rural women in Mewat, as in other poor areas, rarely have time to be the sole caretakers of their children. Even if they are not involved in economic activities, they are not available for childcare. Women's domestic burden poses a greater impediment to childcare responsibilities than their participation in wage earning activities. Domestic labour consumes a tremendous portion of women's time in all poor areas, affecting the care of their children. Most women in Mewat spend a substantial time on household activities, which include cooking and cleaning, fetching firewood from nearby forests, fetching water from the village well or public tap, carrying clothes to the village well for laundering, and taking meals to family members in the fields. Many of these activities are conducted away from home and involve hauling large loads (firewood, water, laundry), so are not easily compatible with carrying a small child. On average, women spend six to seven hours a day performing these domestic activities, of which around two hours are spent away from their homes. In addition to the domestic tasks necessary for daily living, the 'non-working' women also perform 'marginally economic' or 'expenditure-saving' tasks. These involve substituting the women's time for hired labour or processed goods in such activities as harvesting crops, weeding, planting, threshing, manuring, field irrigation, and terracing fields on the slopes of hills. Hence, regardless of their work status, most women spend a great deal of time on domestic activities that are not compatible with caring for their young children. As a result, almost all women rely substantially on older children, older women in the family, and even neighbours to look after their children. Thus, the relationship between a mother's work status and child survival is frequently governed by the requirements of her domestic responsibilities.

This argument is consistent with the results from other time-use studies in a number of developing countries. The exact nature of demands on women's time for domestic activities varies by region and by social class. But studies consistently show high domestic demands on women. These studies also document that women frequently spend less than an hour a day in direct child care (Ware, 1984; Leslie, Lycette, and Buvinic, 1988).

5.5.3 Occupation of father

Table 5.2 shows that occupation of father was significantly related to infant mortality in the gross effects model. Infants whose fathers were working as labourers were twice as likely to die as those whose fathers were not labourers. Fathers' occupation effects were greatly reduced when controls for other variables were introduced in the model (Table 5.3). Nonetheless, infant mortality is significantly affected, even in net terms, by occupation of father. So it may be safely concluded that there are some aspects of life of children whose fathers are not working as labourers which give infants a greater chance of survival to age one, compared with those born in families where fathers work as labourers. This is reasonable if it is assumed that membership of a particular class determines the child's nutrition.

Many studies have documented higher infant and child mortality among the labouring class than among other occupations (United Nations, 1961; Council for Social Development, cited in Vaidynathan, 1972; Natarajan,1980; D'Souza and Bhuiya, 1982; Sandhya, 1986; Kanitkar and Murthy, 1988; Ramanujam, 1988; Registrar General of India, 1988; Irfan 1989; Rodgers *et al.*, 1989; Bhat and Irudayarajan, 1990). The higher infant mortality for children of labourers in Mewat may be due to the fact that in most of the households, where the father is a labourer, the mother of the child is also a labourer to support the economic needs of the family. In the absence of creches, they keep their children with them while working, or leave them at home alone. At the workplace they improvise swings by attaching a piece of cloth to the branch of a tree and within its cramped folded space they sling their babies. All this affects the health of the child adversely. Clean hygienic water facilities at construction sites are usually not provided. Generally there are some earthen pots filled with water and even this water is not changed daily (based on informal interviews with some of the labourers working at the construction site near Nuh block). Also there are no lavatories and urinals at work places. All this affects the environment and increases the possibility of infants getting infections.

5.5.4 *Type of family*

The variable distinguishing joint family from nuclear family shows a significant gross effect (Table 5.2), which becomes insignificant when controls for other variables are introduced in the model (Table 5.3). At the univariate level infants born in nuclear families had 1.7 times the risk of death compared with infants born into joint or extended families. After controlling for all other socio-economic factors simultaneously, infants born into nuclear families still had 1.2 times the risk of death of infants born into joint or extended families, but this was not statistically significant. This may be due to less care of the newborns in nuclear families, especially when the mother goes out for work. In joint families, babies may receive more care, where there are other members of the family besides the mother and father to look after them (Jatrana and Sangwan, 1996).

Both in joint and nuclear families it is the mother who is responsible for feeding, dressing and washing her own child, and she is the one with whom it sleeps. During the day, when the infant is not in need of food or some other attention, it is placed on a cot. Generally, unless a baby cries, no one pays any attention to it. Even when the baby cries, adult response is not prompt, particularly in nuclear families. For example a mother from a nuclear family reported on the question of promptness of response to a crying baby:

> I will try to pick up the baby and try to pacify it in some way but that depends on the loudness of crying and the type of work I am involved in. For example if the baby cries persistently and loudly I may leave the work and pick the baby up. But if I am involved with a task like cooking which I cannot leave, the baby may have to wait until I have finished the work (Field Notes, Mewat, 1996).

Sometimes an elder sibling will look after the child if the mother is busy. Girls are usually kept at home if the younger sibling happens to be a boy. In such families when the mother goes out to work either as a paid labourer or on the family farm, she will carry the baby with her or leave it in the care of an elder sibling. In this context, one case was observed from a nuclear family:

> It was a harvesting time and when I went to one household for interviewing the women I saw that woman had left her one year old son in the care of her three year old daughter. The girl of three year was trying to hold the distressed male baby but was unable to hold him and the baby fell on the ground (Field Notes, Mewat, 1996).

Another arrangement was also found among working women of nuclear families in that infants were left with women aged 55 and older who were not productive. Children, especially female children who were also unproductive and remained at home helped these women. These children were usually aged three to ten years.

In joint families, usually other women help each other, although there are exceptions. In such families any woman or older children of other families may pick up the crying child. If the baby continues to cry, it may be passed from one woman to another while each tries her own methods of distraction and consolation. I saw many grandmothers offering their milkless breasts as pacifiers. If nothing is effective, it is assumed that the baby is hungry, and the mother-in-law or aunt will take over the work of the mother so that she can stop to nurse. During the months when the baby is too old to lie quietly on a cot and too young to walk, it is, if possible, turned over to an older girl to carry when the mother is busy working. As a rule, this caretaker will be an older sister, but a cousin may also take the child if it is a joint family. Although the role of men in the care of infants is generally negligible, in joint families elderly grandfathers or great uncle who are too feeble for farm work are relegated the tasks of rope making, baby tending and guarding the cattle. Such men usually take the baby for an hour or so to the men's platform where they spend the day and thus relieve the mother from child-minding. But when the child begins to cry or fuss, it is quickly returned to the women. Thus in joint families some alternate child carer or helper in domestic work is always available.

5.5.5 Ownership of land

Ownership of land is significantly associated with infant mortality both at the univariate and multivariate levels. At univariate level (Table 5.2) infants born into families owning no land were twice as likely to die in infancy as infants in families owning some land. Controlling for other socio-economic factors simultaneously reduced the effect of this variable but still infants born in families owning no land were one and a half times as likely to die as infants in families owning some land.

Moreover this variable was retained in backward stepwise regression. Hence, its importance as a determinant of infant survival must be considered. In rural areas of India, a family's economic and social status is closely linked to land ownership (Bardhan, 1985). Families who own land usually have greater incomes than landless agricultural wage labourers. Additionally, land serves as an insurance against unexpected catastrophes such as illness or unemployment (Cain, 1981).

Numerous studies in India show higher infant and child mortality among the landless than among the landlords (United Nations, 1961; Council for Social Development, cited in Vaidynathan, 1972; Natarajan,1980; Ramanujam, 1988; Registrar General of India, 1988; Kanitkar and Murthy, 1988; Rodgers *et al.*, 1989). Information on the landholding and child survival relationship is available from studies outside India also. In Bangladesh the death rate among children in a famine year in landless families was over three times that among families with more than three acres of land (McCord, cited in Srinivasan and Mukerji, 1981). Amin (1988) reported that in Bangladesh landownership was associated with lower infant mortality. In Pakistan, noticeably higher infant mortality was found among landless agricultural labourers (Irfan, 1989). In Nepal, the largest landholders have consistently higher proportions of surviving children than those with less land (Tuladhar and Stoeckel, 1983).

How does access to land enhance child survival? For the landholding families an increase in the price of farm products tends to have a positive impact on nutrient intake. Behrman, Deolalikar and Wolfe (1988) estimated the price elasticities of annual nutrient intakes for boys, girls, men and women of rural South India. Of the four basic foods studied, the nutrient intake responses to the price changes for millet, rice, sorghum and pulses were positive. This suggests an indirect positive effect of landholding on child survival.

Some studies have evidenced the better health and nutrition of the children among landholding families. Satyanarayan *et al.*, (1986) found a remarkable influence of land on child health in Andhra Pradesh. About 45 percent of the children in the landlord classes had normal nutritional status and only one-fifth had moderate or severe under nutrition at the fifth year of life. Among the landless, only 15 percent of the children of this age had normal nutritional status and more than half suffered from moderate or severe under-nutrition. Chernikovsky and Kielmann (cited in Pebley, 1984) reported that the amount of land cultivated by the child's household was positively related to the child's growth in terms of weight and height, and nutrient intake in terms of calories and calcium, in Punjab. Also they found that landowners and those cultivating more land had taller and heavier children. Children from landholding families were also found to consume more calories than children of landless labourers, but the difference was not significant.

In India, landholding and household size are positively associated and family nucleation is more prominent among labourer households than among households owing large landholdings (Krishnaji, 1980). Because large landholders have large joint families, elders or grandparents are readily available for childcare. The quality of childcare provided by the elders is significantly different from the care provided by young siblings. Hence, child survival among the landlords may be higher than among landless households which often suffer from the lack of an able person to care for the child.

Some studies have indicated the importance of the mother's health in peasant societies for child survival. Nag (1988) reported that literature on infant mortality in India generally mentions that pregnant women who do heavy physical work face increased risks of infant mortality through premature labour and low-birthweight babies and other factors. Landownership could influence the demands on the physical work of the mother and thus, in turn, maternal health and infant mortality. Khan's (1988) in-depth analysis of the work schedule of five pregnant women in rural Uttar Pradesh shows that labour-intensive family activities associated with poverty hardly allowed them to take rest or proper food. Low calorie intake resulted in severe malnutrition, leading to perinatal mortality and delivery of low-birthweight babies. So, there is reason to believe that among the landless, severe labour demands on mothers, combined with low nutrient intake and less attention to child care, reduces the chances of child survival.

5.5.6 Ownership of livestock

Ownership of livestock shows a significant gross effect (Table 5.2), which becomes insignificant when controls for other variables are introduced in the model (Table 5.3); this may be due to lack of variation in possessing livestock. Only 18 percent of children belong to families who do not own livestock. Although owning livestock is not statistically significant in net terms to infant mortality, the sign of the coefficient implies that ownership of livestock is inversely related with infant mortality.

Mewat's animal population includes bullocks and bulls, buffaloes, cows, goats, sheep, donkeys, mules, camels and poultry. The Mewati word for cattle is *dhan,* which means 'wealth'. Regardless of market value, ownership of cattle is considered a sign of affluence; therefore, cattle raising has become a status symbol (Aggarwal, 1971: 88). Apart from their value as draft animals and producers of milk, butter and *ghee,* cattle are of crucial significance in the village because of their dung, which is used as fertiliser in the fields and as fuel. The *kumbhars* (pot makers) also need dung for the firing of their pottery.

In Mewat, beside providing nutritious food (milk), cattle have become a major source of income. The critical importance of milk as an item of diet is obvious, particularly in relation to children: it brings calcium, butterfat, vitamins, and some animal protein into a diet otherwise dominated by carbohydrates, vegetable oils, and vegetable protein. There is almost nothing in the native diet equivalent to Western processed baby food to fill the gap between dependence on mother's milk and starting adult food. The food available in the house is prepared according to the needs of adults and not well-suited to infants. For example *roti* or *chappati* (unleavened bread) is hard for a baby to eat, so in many cases the *roti* is dipped in milk to soften it and then given to the baby as a supplement at weaning. The absence of milk has serious effects on a child's growth.

Some products such as milk and *ghee* fetch a high price. When I was in the field, *ghee* was sold in the village for 120 rupee a kilo, equal to five Australian dollars, and milk was sold for ten to twelve rupees a kilo, equal to fifty Australian cents. However, not all families who own cattle are able to sell *ghee* because they sell milk, and the milk for home consumption is just sufficient to produce *ghee* for immediate requirements.

5.6 Effect of socio-economic factors after adjusting for demographic and cultural factors

In Mosley and Chen's model, socio-economic determinants only indirectly affect infant and child mortality. Maternal factors, directly influenced by socio-economic variables, are regarded as one of the proximate determinants of infant and child mortality. Accordingly, in this study I expect that socio-economic variables will directly affect maternal factors, which will have a positive influence on infant survival chances. Thus, I hypothesise that, based on Mosley and Chen's mortality model (1984), socio-economic variables only indirectly influence infant mortality through the proximate determinant of health services utilisation. If this argument holds, when the effect of maternal factors is controlled, the effect of socio-economic factors will become attenuated.

The empirical data support this hypothesis. The results from the hazards model analysis (Table 5.4, Model 3) indicate that once the maternal and cultural factors were introduced, the effect of father's occupation and ownership of land was reduced and no longer significant at the 10 percent level. This absence of significant results for socio-economic factors is consistent with findings from Bangladesh (Chowdhury, 1982; Phillips and Mozumder, 1984; Majumder, 1989), from Pakisthan (Knowles, 1979), from Egypt (Kelley, Khalifa, and El-Khorazaty, 1982; Hoodfar, 1984, 1986; Casterline *et al.*,1989, 1992), and from Thailand (Frenzen and Hogan, 1982).

Moreover, it has been argued that the relative importance of the effect of socio-economic and demographic factors on infant mortality varies with the level of socio-economic development of the nation. Kim (1988) observed that in a traditional society, demographic factors affected infant mortality more than did socio-economic factors. Gubhaju *et al.* (1991), using data from Nepal, argued that in less developed areas, and early stages of development demographic rather than socio-economic factors are more important determinants of infant mortality. The analysis of Mewat field data 1996 was consistent with this hypothesis, indicating that when infant mortality rates were high, demographic factors such as maternal age, previous birth interval and survival of preceding child were the important determinants, while socio-economic factors were less important. This finding from the present study also seems to agree with Mosley and Chen (1984) and suggests that, at least in one of the less developed areas, Mewat, the effect of demographic and cultural factors on infant mortality is immense and socio-economic factors operate through them.

Table 5.4 Summary results[a] from Cox proportional hazards model for the effect of socio-economic, demographic and cultural factors on infant mortality: Model 3[b] (Multivariate model), Mewat, 1996

Covariates	Regression coefficient β	Exp (β)	SE	95% confidence interval
Father working as labourer				
No	0.0000	1.0000		
Yes	0.1528	1.1651	0.2563	0.7051- 1.9253
Owning any land				
Yes	0.0000	1.0000		
No	0.3135	1.3682	0.3140	0.7051- 1.9253
Maternal age at birth				
<20 years	0.0000	1.0000		
20 + years	1.0986***	2.9998	0.2426	1.8645- 4.8265
Preceding birth interval				
<24 months	0.0000	1.0000		
24+ months & 1st births	0.4922*	1.6360	0.2715	0.9609- 2.7853
Survival of previous child				
Alive & 1st births	0.0000	1.0000		
Dead	0.6539*	1.9231	0.3541	0.9608- 3.8493
Utilisation of colostrum				
Yes	0.0000	1.0000		
No	1.2429***	3.4657	0.3166	1.8632- 6.4464

Source: Mewat field data, 1996

Note: [a]Results based on a total of 950 cases: 83 died during infancy; 867 either survived the infancy period or were censored at survey date.

[b]Model contained all covariates listed in Table 5.3 that were significantly associated ($p<0.10$) with infant mortality, with addition to demographic and cultural covariates to model.

*P<0.10

***p<0.000

Utilisation of colostrum emerged as the most important factor influencing infant mortality in Mewat, followed by maternal age at birth, survival of previous child and preceding birth interval. As discussed in Chapter Four, tradition in Mewat supports the practice of delaying initiation of breastfeeding, thereby depriving the infant of valuable colostrum. In Mewat breastfeeding is generally initiated at least 24 hours after birth. The colostrum is discarded because of the general belief that it is 'heavy', so difficult to digest or not good for the child. As the colour of the initial milk is not pure white, there is a perception that in the first one or two days, mother's milk is not pure and could harm the child. Pre-lactation food includes water with honey, sugar or jaggery or plain water, or cow or buffalo milk diluted with water. I observed that the mode of giving pre-lactation food is often unhygienic as the diluted milk or water and sugar mixture is fed to the infant with a piece of cotton or a rag, and fingers are used to feed honey. Because of the general lack of knowledge about cleanliness and hygiene, these pre-lactation practices could easily cause infection and lead to diarrhoea.

Maternal age at birth was the second most significant factor affecting infant mortality. Children born to young mothers (<20 years) were at a significantly greater risk of infant mortality; they were three times as likely to die as children born to mothers over 20 years of age). This suggests that very young mothers may not be physiologically and emotionally mature enough to adequately manage a pregnancy (Pebley and Stupp, 1987: 43). The increased risk of infant death to the younger mother may be due to biological incompetence of early childbearing, for example, at younger maternal ages, the reproductive systems have not matured sufficiently to produce strong, normal weight babies (Madise and Diamond, 1995: 97). Young mothers may bear premature and low birth weight infants because of poor nutritional status, inadequate use of antenatal care and lower educational achievements (Gribble, 1993: 139). In addition, most teenage mothers do not receive prenatal care (Trussell, 1988). They may also have poor child-care skills, which derives partly from inexperience in child rearing (Suchindran and Adlakha, 1981). Moreover, they may be unable to obtain an adequate share of food and other household resources for their children, since they may have little influence on the allocation of household resources (Ikamari, 1996). Hence, this study confirms the usual pattern of higher risks of infant mortality among children born to younger mothers.

The survival status of the preceding child was another significant factor affecting infant mortality. Children of mothers whose previous child had died in infancy were at a significantly greater risk of dying than children born to mothers without such a history, irrespective of socio-economic or other demographic settings. As discussed in Chapter

Four, these results show a strong intra-family mortality correlation during infancy among successive births. These results are in agreement with other studies which have found an intra-family mortality relationship in infancy (Gubhaju, 1984: 134; Hull and Gubhaju, 1986: 118; Majumder, 1989: 132-178; Ebong, 1993:12).

The analysis also shows that birth interval is also significantly associated with infant mortality even when the effects of socio-economic, demographic and cultural factors are controlled. A preceding birth interval of less than 24 months was associated with significantly higher infant mortality risks than birth intervals of at least 24 months. Evidence from developing countries over the last two decades shows that birth interval remains the most important predictor of infant and child mortality risks, even when controls are introduced for the confounding effects of socio-economic, demographic and environmental factors (Cleland and Sathar, 1984; Hobcraft *et al.*, 1985; Palloni and Millman, 1986; Palloni and Tienda, 1986; Pebley and Millman, 1986).

5.7 Summary

The analysis in the present chapter has examined infant mortality differences in Mewat according to seven important socio-economic factors: mother's education, father's education, mother's work status, father's occupation, type of family, ownership of land, owing livestock. Among all the socio-economic factors, only father's occupation and ownership of land tend to show a significant relationship with infant mortality in the multivariate analysis. Some previous studies have also shown an insignificant net effect of socio-economic characteristics with infant mortality.

Although there has been considerable recent emphasis on the role of parental education as a determinant of infant and child survival, these data fail to reveal a significant parental schooling effect. Despite the absence of significant effects, the estimated relative risks suggest that infant survival chances do improve with parental education. The lack of significance may be due to the relatively small number of cases under analysis and almost universal and prolonged breastfeeding. Women's work status is not significantly associated with infant mortality. This may be due to the fact that employed women in this population do not differ from their non-employed counterparts in their time spent in direct child care. While employed women work in paid labour in agriculture, housewives work as unpaid workers on the family farm. Owning land and father's occupation emerged as the most important determinants of infant survival.

The findings from the present study also support the hypothesis that in the early stages of a society's development demographic factors are more important than to socio-economic factors. This also seems to agree with Mosley and Chen (1984) and suggest that, at least in Mewat, the effect of demographic and cultural factors on infant mortality is immense and socio-economic factors operate through them. The effect of father's occupation and ownership of land was reduced when demographic and cultural factors were taken into account. Their effect was no longer significant even at the 10 percent level. After controlling for demographic and socio-conomic factors simultaneously, utilisation of colostrum emerged as the most important factor influencing infant survival in Mewat, followed by maternal age at birth, survival of previous child and preceding birth interval.

The effects of demographic, cultural and socio-economic factors are not net of the influence of the environmental factors examined in this thesis. Therefore further analysis of the effects of these variables is presented in Chapter Six where environmental factors are also incorporated in multivariate analysis of infant mortality.

CHAPTER SIX

THE ENVIRONMENT OF INFANT DEATH IN MEWAT

6.1 Introduction

High morbidity and mortality rates in infancy and childhood in developing countries are often considered to be largely due to poor environmental conditions. Diarrhoea, a disease highly influenced by poor environmental conditions, including water and sanitation facilities (Stephens, Mason and Isely, 1985), is one of the major killers of children in developing countries (UNICEF, 1988). The World Health Organization (1995) estimates that each year in developing countries acute respiratory infections, (primarily pneumonia) are responsible for 4.1 million deaths of children under the age of five years. The major causes of these deaths are environmental factors such as crowding and indoor air pollution (Pio, Leowski and Ten Dam, 1985, Miller, 1985). In Mosley and Chen's (1984) model, household environmental contamination variables are one of the five sets of proximate determinants through which socio-economic factors operate to influence child survival. Household environmental contamination variables are the direct causal variables that influence infant and child mortality (Merrick, 1985). The quality of the immediate physical environment strongly influences the child's risk of exposure to infectious diseases and to injury (Moore, Cruz and Mendez, 1965; Puffer and Serrano, 1973). The higher the quality of the physical environment, the smaller the burden of daily cooperation of individual household members to minimise the risk of exposure (Tekce and Shorter, 1984).

Many studies have considered the relationship of environmental conditions and infant to child health and survival (DaVanzo *et al.,* 1983; Trussell and Hammerslough, 1983; Jain, 1985; Merrick, 1985; Rahman *et al.*, 1985; Esrey and Habicht, 1986; Victora *et al.*, 1988; Pickering *et al.,* 1986; Barrera, 1990; Gubhaju *et al.,* 1991). Still relatively little is known about the relationship between environmental factors and child survival in many areas of the developing world, including India. Moreover, knowledge about the consistency of findings across countries, over different periods, and for different indicators of child health is extremely limited. This type of information is important, however, to help design effective intervention strategies to reduce child mortality. This chapter thus examines the role of household environmental factors in explaining differentials in infant mortality in Mewat region.

The chapter has three main purposes. The first is to examine the extent to which each environmental factor explains differentials in infant mortality. The second is to investigate the extent to which their respective effects are altered when other environmental factors are included as controls. The third is to assess the relative effects of environmental factors on infant mortality when socio-economic, demographic and cultural factors are also taken into account. This chapter begins with a description of the physical environment of villages and houses in Mewat, followed by results and discussions and summary.

6.2 The physical environment

6.2.1 The village scene

The arrangement of houses in Mewat may appear patternless, but in the minds of people the sites where their houses are situated have many clear divisions. Usually people belonging to one caste or ethnic group are clustered together. The houses of the dominant group, such as those of Meos, are clustered together, for the most part, in the centre of the village which forms the main settlement, while other groups are found in scattered marginal parts of the village. The houses of some other groups such as Brahmans , Jats and Banias are also in the centre. Most of the lower castes like the Chamars, the Kumbhars and the Bhangis are on the outskirts and their settlements are known by the name of the group that dominates them numerically. For example, in the study area I came across Chamar Basti (hamlet) and Bhangi Basti. Besides the low-caste houses, there are houses of the refugees from Pakistan who were allotted land on the outskirts. With time the built-up area became crowded, and some more affluent families among the dominant group moved outside the main settlements and settled on their own land.

The distinguishing feature which marks the strength of the Meos in each village is the mosque with its minarets rising above the surrounding country (Amir-Ali, 1970: 50). These mosques present a contrast to the disorderly appearance of the surrounding habitations. Each village has at least one *chaupa,* or men's club that serves communal functions. These large and quite imposing *chaupals* are usually situated on the main transverse road.

The villages have various winding lanes or streets called *galis* which separate the various caste *pattis.* These streets, which are usually narrow, but wide enough to accommodate a bullock cart, run through the village, with houses on both sides usually facing each other. The lanes are mostly unpaved and have no drainage system; a quick glance at them reveals an accumulation of scattered litter and dirt. Some of them turn into drains in the monsoon season; when it rains, pools of water may even seep into low-level houses. During the dry season, every passing vehicle leaves behind a thick cloud of dust.

The *galis* serve multiple purposes. First, they serve the purpose of a dairy. In most of the *galis* of the surveyed villages, cows and buffaloes were tethered on either side. This happens when the household has no place for a cattleshed. The cowdung dropped and the hay scattered for the cows to eat are a permanent feature of the litter in the *galis.* During the rainy season this creates a breeding place for flies and mosquitoes. Second, the *galis* also serve as a place of business. Some households, which are near the school, have established businesses in the *gali* by selling things such as cheap snacks. Their primary customers seemed to be school children during recess, who can be seen eating the food while roaming around in the *gali.* Third, the *galis* also serve as playground, as well as a meeting place for the teenage boys. It is usual for children to play just outside the house near the garbage heap or the makeshift animal shed, with or without footwear. Children gather readily around a visitor and follow him or her down the narrow streets and in and out of houses. Cows and bullocks wander through the streets among the people.

Around the village, and also in various open places within the village itself, stand small or large piles of dung cakes. The large piles are known as *bitauras* and are covered with straw matting. Both types of dung heaps are neatly, even elegantly constructed and receive great care. Other structures in the village which show evidence of artistry are the straw-matted, broad-based conical structures known as *boongas* which are used to store wheat and barley chaff for animal feed.

Public taps supply water for human and animal needs, but still some households prefer to get water from the village well because public taps are more distant. Some households even complained about the taste of tap water. They believe that well water is sweet (*meetho panni*) and that tap water is saline (*kharoo panni*). Whatever the source of water, an attractive sight in the morning and late afternoons is the file of women, in small family groups, carrying water either from the public taps or village wells. Large water pots are balanced on their heads, usually secured by a cloth ring set beneath the pot. Since the area does not have a 24-hour water supply and water is available only in the morning and later in the afternoon, the storing of water is necessary. The general practice is to store water in covered clay vessels called *mataka*, which are kept separately near the kitchen. Some relatively affluent houses also have water tanks for storage.

6.2.2 House scene

Little effort at decoration is discernible in the houses in Mewat, although there are red handprints on the walls of some of them; these are made at the time of a wedding, or when a son is born. The houses in Mewat have two elements, one for males and another for females. The male element is called *bangla* or *baithak* and the female element is called *ghar*. The *bangla* or *baithak* is a large, well-ventilated, commodious, thatched or *pukka* room, some distance from the *ghar*. It is furnished with six or seven cots. An essential item in the *bangla* is a large *hukka* (water pipe), smoked by the men of the house and offered to guests in hospitality. Also in the *bangla*, a smouldering fire of cowdung cakes burns twenty-four hours a day for lighting the *hukka*. The prosperous families build their *bangla* or *baithak* of bricks. Poorer families have quarters of mud, often consisting of nothing more than a small hut or an extra room. The size and type of construction of these houses are an indication of the wealth and status of the family.

Usually only men use the *bangla-baithak*, for social purposes and for sleeping. Women visit it during the day for chopping the fodder for the animals, as a chaff-cutter is often kept there. Men are seldom seen in the home (*ghar*). During the day they work in the fields and when not working they spend time with their friends in the *bangla-baithak*, where they sit together, chatting and smoking the *hukka*. All males of the household, including boys over seven years of age, sleep in the *bangla-baithak* at night. Married men may visit their wives in the *ghar* only briefly at night for sexual purposes. Even when they go to their wives they return silently to the men's quarters before dawn so as not to disturb the other occupants of the room. The *baithak* is sometimes located in the same compound as the women's *ghar*, but often it is in a completely separate place, many streets away. It can be separate or with a cattle enclosure in which cattle are kept. Sometimes a cattleshed is a separate place. If the family does not have a separate place as a cattleshed, the animals are tethered in front. In some households the animals were tied in the middle of the courtyard while a few others had a makeshift shed in the extended space in the front of the house. Some households possessing these animals were running a milk-selling business.

The main part of the house where the women and children live, the *ghar,* is usually located behind the *baithak* at some distance. The *ghar* may have one or more rooms depending upon the size and affluence of the household. Each of the rooms has a door that can be locked, but has no windows. Generally there is a verandah or a courtyard in front of the rooms. That part of the house opens into the courtyard, never to the outside. Usually there is a staircase in the courtyard to go to the roof. In the courtyard there are usually one or two cots which are used for sleeping, sitting, baby-parking, grain drying and dish draining. The floor of the courtyard is surfaced with a mixture of water and cowdung and renewed every week. When dry this forms a hard, dustless, water-absorbent surface which is very functional. There is usually a drain in one corner of the courtyard through which wash and bath water can funnel out into the street. The drain is sometimes used as a child's toilet. Part of the courtyard may be used as a cattle compound for cows and buffaloes.

Village houses may be classified into three types according to the materials used in their construction: *kachcha*, a house made of unfired mud bricks; *pukka,* a house made of fired bricks throughout (including roof, walls, and floor); and *kachcha-pukka*, a house made of both types of bricks. Those who can afford it construct *pukka* houses of stone and mortar with arched or beams supported roofs. Some affluent people have constructed *havelis* (big *pukka* houses). The *pukka* houses are the habitats of the well-to-do. The *pukka* or cemented houses are vastly better than the mud homes of the poor, which are comparatively shapeless. The *kachcha* and *kachcha-pukka* houses are called *chhappars,* and are thatched houses or flat-roofed mud houses. As a defence against the rain, these houses are sometimes equipped with roofs of tin sheeting or sloping thatch, but most *kachcha* houses have flat mud roofs. Owing to the likelihood of flooding during the rainy season, even the *kachcha* houses are built of stone up to the plinth level so that they do not fall down. These mud houses are quite uncomfortable during the rainy season when cattle, dung, urine and mud accumulate and the houses become hot, smelly and full of mosquitoes. Chunks of mud are thrown about by the swishing of the cows' tails.

During my field survey, I heard many complaints about housing conditions, with more expressions of the need for improvement among those with better housing than among those with the poorest quarters. The absence of financial resources makes improvement seem impossible to the poorer villagers. Those who lived in *pukka* houses said that they would like chimneys built, separate quarters for animals and a separate room for bathing. Many families said that they would like to have separate shelters for cattle. Many wanted a second storey and more rooms. Some wanted new wooden beams and a new plastering of the walls. Very few houses had latrines, but no one expressed a wish to have one, and many raised objections to the suggestion of having a latrine or toilet within the house. Toilets in this area are usually without a flush tank attached to them and the toilet has to be flushed manually.

6.2.3 Garbage disposal

Seen from within, a large number of the houses were clean compared to the outside environment. In the majority of cases garbage was collected inside the courtyard which meant that the household garbage was placed within the courtyard, either in a corner closest to the outer door or under the staircase. There is no concept of keeping the garbage in a bin, covered or uncovered so it accumulates in the open. Some households did not even accumulate the garbage in one corner, and garbage was left lying in the courtyard, to be swept up later during house cleaning and dumped beside the house. Other households, however, disposed of their refuse at a garbage 'tip' called *kurdi*, which is not far from the residential area. Garbage outside the house was not considered the responsibility of the resident. Some of the litter in the *galis* was the accumulation of small amounts of garbage thrown out during cleaning, including the garbage of households which did not accumulate their garbage in a corner of their house.

6.2.4 Place of cooking

Family cooking is done on the hearth, a mud, U-shaped fire-place about a foot square and six inches high, usually built against one of the courtyard walls. The cooking pot rests on the mud support, and cowdung or wood is burned beneath it. The hearth is given a new coating of cowdung paste every morning in order to making it ritually pure for the day's cooking. In Mewat usually there is no separate room for cooking. Cooking is done inside the room during most of the year and outside in summer. The place for cooking is also the place for eating, particularly for women and children, and, during winter, for getting warmth, and for living and storing. Amir-Ali (1970: 50)observes:

> The dwelling itself generally consists of a verandah and one or more rooms-both raised two or three feet above the ground level. The rooms, seldom more than 10 feet by 12 feet, serve for living and cooking and storing of what earthly goods each house-hold possesses.

Eating is a strictly private matter in the village. Each man eats either at his own hearth or in the men's quarters. Each woman either eats in the room where she cooks or takes her food into a corner of the courtyard where she can turn her back towards the other women. Children are fed when they demand food and may eat together or separately, depending on whether they get hungry at the same time. Also, storing food is not a very common practice because one cooked dish is just enough for a meal, in view of the large number of family members; and the most common staple food used in Mewat is *roti* which is made just before the meal is served.

Since the women do most of their work on the floor, the food dishes, grain dishes and so on are usually placed on the floor. This makes a crawling baby something of a nuisance, although little can hurt him except the hearth fire or a knife. If the infant is crawling towards some area where it should not be, or playing with some object which it should not have, an adult simply removes either the baby or the object.

6.2.5 Place of bathing

If a person wishes to bathe, he or she uses water from a pot or pail. The women bathe in the courtyards behind screens of cots placed on edge. Some of the women's houses have a small walled-off portion which is used as a bathroom. The men bathe by the village wells. Both sexes remain clothed while bathing and, when finished, wrap clean dry clothes around themselves, dropping their wet clothes from underneath the fresh ones without ever exposing their bodies.

Mothers usually bathe children daily in summer but less often during winter. Sometimes when the mother is extremely busy, an indulgent mother-in-law may bathe the baby, but for the most part, the older women consider that they have reached an age deserving of some leisure, and they expect their daughters-in-law to care for their own young ones as well as to attend to household tasks. Bathing the babies is a most distressing experience. Babies, like adults, are given 'sponge baths' with water from a bucket or pot. The mothers ordinarily do not use soap when washing the babies, but they rub the eyes rather vigorously with the heel of the hand and often are not very gentle in their handling of the baby during the bathing. Babies usually cry and struggle violently while being bathed, and they particularly dislike having their face and eyes washed.

6.2.6 Place of defecation

For everyone except children the field is the place to defecate. The men may go alone, the older women always in groups; but they take with them a small brass pot or glass bottle filled with water to wash the buttocks after elimination. There is little fuss about toilet training for the children. After the child can understand instructions, the mother repeatedly tells him/her not to soil the bed. He/she may be beaten if he/she does so. The young children use the courtyard's drain if there is one; they may also use the streets. The mother takes the child out into the fields as he/she grows older, until he/she learns to go there for the purpose of excretion.

Babies are not diapered; they wear only a short shirt and sometimes a cap or scarf on their heads. When put on a cot, they are laid on a sheet which then serves the purpose of a diaper. When the baby is being held by someone, it is simply held away when it urinates. Sometimes the mother sits the baby on her own feet while it urinates. Since the urine is quickly absorbed into the mud floor of the courtyard and the hot sun dries the moisture in a few minutes, accidents of bladder control on the floor present no problem. At night the mother holds the baby away from the bed if the urination awakens her. Some mothers did complain that their babies wet them frequently because the mothers slept too soundly.

Bowel movements are regarded somewhat less casually. The mother tries to anticipate the baby's bowel movements and holds him over the courtyard drain or a pile of trash in the cattle compound at what she considers to be the appropriate times. When the baby does eliminate on the floor or on someone's clothing, he is quickly removed from the faeces and washed. Although the women sometimes show mild disgust at a baby's bowel movements, their reaction is surprisingly mild considering the extreme disgust attached to adult faeces which can be removed only by a sweeper, the lowest of the Untouchable castes in the village.

Toilet training usually occurs during the second year of life when the child starts walking. By this stage, the child is led to the courtyard drain, to the cattle compound, or to the street just outside the house to urinate or defecate. Adults may make a '*sa-sa-sa*' sound to encourage urination. Later, when the mother sees the child squatting, she encourages him/her to go by himself/herself to the cattle compound - if there is one- inside the courtyard. Most children learn to eliminate in the proper spot during their second year, although some do not go by themselves until the third year. Since children ordinarily wear only shirts, they have no clothes to remove for elimination; thus the learning process is not difficult. During winter children sometimes wear pyjama trousers. However, if a child is not yet toilet trained, he/she wears trousers with the crotch cut out- the very opposite of diapering.

For some time after children have learned to go to the drain in the day time, they may still wet the bed at night. If the night is cold and wet, the mother may encourage the child to urinate in the room. A few mothers reported that they refused to do this and always used the courtyard. The last stage of this learning process is learning to use water to wash after a bowel movement. Mothers wash babies and young children. By the age of four or five years, the children have learned to do this themselves and may sometimes be seen eliminating by a stream and washing themselves.

6.3 Variables used

The household environmental contamination variables used in the following analysis are the source of drinking water, the presence of latrines in the house, type of house, persons per room, presence of a separate kitchen in the house, presence of a separate bathroom in the house, type of cooking fuel, refuse in courtyard, and cattle inside the courtyard (Table 6.1).

The variable 'source of drinking water' is classified into two categories: piped water or non-piped water that the household uses for drinking purpose. Although the Mewat survey collected information on type of toilet facility, there is not much variation in toilet type. Therefore, the variable 'presence of toilet' identifies whether the household has a toilet regardless of type. Type of house is classified into *pukka* house if it is made of fired bricks throughout (including roof, wall and floor) and *kachcha* if a house is made of unfired bricks. The category *kachcha* also includes semi-*pukka* houses which are made of both types of bricks. Room density (crowding) was calculated by dividing the total number of persons living in the house by the total number of rooms in the house (excluding kitchen, bathroom). This continuous variable was divided into two categories by taking the median of the distribution (less than or equal to three persons per room).

Table 6.1 Distribution of live births by categories of independent environmental variables, Mewat, 1996

Variables	Live births	Infant deaths
Source of drinking water		
Piped	318 (34)	17
Non-piped	632 (66)	66
Presence of latrines		
Yes	95 (10)	7
No	855 (90)	76
Types of house		
Pukka/ cemented	214 (23)	12
Kachcha/ not cemented	736 (77)	71
Persons per room		
3 or less	446 (47)	17
More than 3	504 (53)	66
Presence of separate kitchen		
Yes	312 (33)	18
No	638 (67)	65
Presence of separate bathroom		
Yes	218 (30)	21
No	669 (70)	62
Type of cooking fuel		
Cleaner fuels (Kerosene, coal, gas)	65 (7)	4
Biomass fuel (cow dung cakes, wood)	884 (93)	79
Refuse in the courtyard		
No	306 (32)	13
Yes	642 (68)	70
Animals in the courtyard		
No	640 (67)	49
Yes	310 (33)	34

Source: Mewat field data, 1996
Notes: Figures in parentheses are percentages.

The variables relating to presence of separate kitchen and bathroom denote whether the household has a separate place designated as kitchen and bathroom. The

Mewat Survey collected data on a ninefold classification of primary cooking fuel, including wood, dung cakes, coal/coke/lignite, charcoal, kerosene, electricity, liquid petroleum gas, biogas and a residual category of other fuels. However, for the analysis, the various cooking fuels were grouped into two categories- cleaner fuels (coal/coke/lignite, charcoal, kerosene, electricity, liquid petroleum gas, biogas) and biomass fuels (wood or dung). Mishra and Retherford (1997) also used a similar classification of cooking fuel. The variable refuse in the courtyard denotes that refuse was disposed of inside the courtyard in the open. The variable animals in the courtyard means that the household does not have a separate cattleshed and the animals are tethered inside in the courtyard.

As suggested by Mosley and Chen (1984), levels of environmental contamination reflecting the various routes by which diseases spread are measured by a series of simple physical indices that are known to be strongly correlated to the levels of biological contamination of the environment. Crowding (persons per room), domestic smoke (type of fuel used for cooking) and cooking in the living room (presence of separate kitchen) are approximations for contamination and risk of contact-acquired respiratory infections. Crowded conditions may affect health as well as the quality of life. Water contamination is related to the source of drinking water supply (piped or non-piped) and potential faecal contamination to the presence of latrine or toilet. Other housing environmental characteristics such as type of house (cemented or non-cemented), refuse disposal (refuse in the courtyard or otherwise) and presence of cattle inside the courtyard are expected to have an effect on mortality because these conditions are closely related to the risk of exposure to infectious agents.

However, some of these variables simply reflect other factors that directly or indirectly affect child health and survival. For example, type of house, presence of separate kitchen and presence of separate bathroom may reflect the socio-economic status of the family and also determine the environmental conditions of the household.

6.4 Results

The results from the proportional hazards regression analysis are presented in three separate model specifications (Tables 6.2, 6.3 and 6.4). Model 1 (Table 6.2) which is a univariate model estimates the gross effects on infant survival of each environmental variable listed in Table 6.2. Model 2 (Table 6.3) which is a multivariate model, estimates the net effects of each environmental variable by controlling for other environmental factors in the model. Model 3 (Table 6.4) expands on Model 2 by introducing socio-economic, demographic and cultural variables into the model. The objective of Models 2 and 3 is to determine whether the estimates of Model 1 change if these control factors are included and to find out which of the environmental factors are significant predictors of infant mortality.

Results based on Model 1 (Table 6.2) show that the variables that are significantly associated with infant mortality at the univariate level are the source of drinking water, type of house, room density, presence of a separate kitchen, refuse disposal and cattle in the courtyard. The results of the proportional hazards model 2, presented in Table 6.3, represent the risk of infant death associated with each covariate relative to the risk for the reference category, holding constant the effects of all other covariates. Model 2 contains all covariates listed in Table 6.2 that were significantly associated ($p<0.01$) with infant mortality. The variables that remained significant even after controlling for other environmental covariates (Table 6.3) were room density, refuse in the courtyard and presence of animals in the courtyard. The association of mortality with the source of drinking water, type of house and presence of a separate kitchen became insignificant after adjusting for other environmental factors.

Table 6.2 Summary results[a] from Cox proportional hazards model for the effect of environmental factors on infant mortality: Model 1 (Univariate model), Mewat, 1996

Covariates	Regression coefficient β	Exp (β)	SE	95% confidence interval
Source of drinking water				
Piped	0.0000	1.0000		
Non-piped	0.6983***	2.0104	0.2720	1.1797- 3.4261
Presence of latrines				
Yes	0.0000	1.0000		
No	0.1834	1.2013	0.3950	0.5539- 2.6054
Type of house				
Pukka/ cemented	0.0000	0.0000		
Kachcha/ not cemented	0.5577*	1.7467	0.3121	0.9474- 3.2203
Persons per room				
3 or less	0.0000	1.0000		
More than 3	1.2652***	3.5439	0.2720	2.0794- 6.0397
Presence of separate kitchen				
Yes	0.0000	1.0000		
No	0.5771**	1.7808	0.2663	1.0566- 3.0014
Presence of separate bathroom				
Yes	0.0000	1.0000		
No	0.2219	1.2485	0.2525	0.7611- 2.0479
Type of cooking fuel				
Cleaner fuels (kerosence, coal, gas)	0.0000	1.0000		
Biomass fuel (cow dung cakes, wood)	0.3777	1.4589	0.5125	0.5343- 3.9836
Refuse in the courtyard				
No	0.0000	1.0000		
Yes	0.9772***	2.6569	0.3020	1.4699- 4.8025
Animals in the courtyard				
No	0.0000	1.0000		
Yes	0.3788*	1.4605	0.2322	0.9430- 2.2620

Source: Mewat field data, 1996

Note: [a]Results based on a total of 950 cases: 83 died during infancy; 867 either survived the infancy period or were censored at survey date.

*p<0.10

**p<0.05

***p<0.01

6.4.1. Source of drinking water

Availability of pure drinking water is one of the most important means for reducing infant mortality because a significant proportion of infant deaths is attributable to waterborn diseases. The present analysis shows that the risk of infant mortality in households which did not have piped drinking water was twice as high as for those which did have piped drinking water (Model 1). Controlling for other environmental factors simultaneously reduced the strength of the effect of piped water and its effect became insignificant. Still, the relative risk of dying in infancy for infants of families without piped drinking water was one-and-a-half times as high as for infants born to families with a piped drinking water.

Table 6.3 Summary results[a] from Cox proportional hazards model for the effect of environmental factors on infant mortality: Model 2[b] (Multivariate model), Mewat, 1996

Covariates	Regression coefficient β	Exp (β)	SE	95% confidence interval
Source of drinking water				
Piped	0.0000	1.0000		
Non-piped	0.4138	1.5125	0.3290	0.7937- 2.8821
Type of house				
Pukka/ cemented	0.0000	1.0000		
Kachcha/ not cemented	-0.4028	0.6684	0.3856	0.3140- 1.4231
Persons per room				
3 or less	0.0000	1.0000		
More than 3	1.1299***	3.0955	0.3002	1.7187- 5.5753
Presence of separate kitchen				
Yes	0.0000	1.0000		
No	0.2560	1.2918	0.2855	0.7382- 2.2607
Refuse in the courtyard				
No	0.0000	1.0000		
Yes	0.8622***	2.3683	0.3095	1.2911- 4.3442
Animals in the courtyard				
No	0.0000	1.0000		
Yes	0.4889**	1.6306	0.2274	1.0442-2.5461

Source: Mewat field data, 1996
Note: [a]Results based on a total of 950 cases: 83 died during infancy; 867 either survived the infancy period or were censored at survey date.
[b]Model contained all covariates listed in table 6.2 that were significantly associated ($p<0.10$) with infant mortality.
*$p<0.10$
**$p<0.05$
***$p<0.01$

These results are in agreement with findings from Brazil (Victora *et al.*, 1988) and India (Jain, 1984). In South Brazil, infants whose homes had piped water had a diarrhoea mortality rate that was 80 percent lower than those from homes with no easy access to piped water (Victora *et al.*, 1988). Use of tap water was negatively correlated with the IMR in India (Jain, 1985). However, the availability of safe drinking water may not be solely responsible for the reduction of infant mortality because in households with a piped water supply, personal habits and domestic practices may be more hygienic than in households without piped water since less time is spent on water collection and mothers may have more time to observe hygiene practices. Mothers with access to a tap in the yard were three times as likely to practise good hygiene as mothers using wells outside the compound, and twice as likely as mothers who used public standpipes or wells within the yard (Curtis *et al.*, 1995). Thus, improving sources of water can contribute to better hygiene.

In Mewat a large number of households (66.5%) are still without any source of potable water. Moreover personal habits and domestic practices in using the available water are also important. The following observation during the field survey was not uncommon:

> Rahman, around 10 months old was crying loudly. It seemed he was demanding something, as he was persistent in crying. His mother was busy with cooking which she could not leave. Initially he was not paid any attention but as he was persistent in crying, his 7-year-old sister Akmali was called by his mother to give him some water. Akmali promptly picked up a metal pot with a wooden handle from the ground and took out water from the container and used her dirty hand in making him drink water (Field notes, Mewat, 1996).

It is a common practice in Mewat (and also in rural India) that infants and young children are cared for by the older siblings, especially girls who themselves are often only five to seven years old. Being totally ignorant about the importance of clean drinking water, the children themselves not only drink contaminated water from any source within their reach, but also give the same water to their siblings, leading to a heightened risk of diarrhoeal diseases.

6.4.2 Availability of toilet facility

Although the effect of availability of toilet facility in the house was in the expected direction, it was not statistically significant even at the univariate level. These results are in contrast with those found in the Philippines (Martin *et al.*, 1983), in Malaysia (DaVanzo and Habicht, 1986; Peterson *et al.*, 1986), and in Sri Lanka (Meegama, 1980) which suggest a significant effect of presence of toilet facility on infant and child mortality. This absence of significant results for sanitation facility is consistent with findings from Brazil revealing that household toilet facilities are related very weakly to child mortality risks (Victoria, Smith and Vaughan, 1986; Victoria *et al.*, 1988) and from Kenya where toilet sanitation is not statistically significant (Anker and Knowles, 1980). Moreover, in Malaysia, sanitation facilities have been found to be more important than water supply in reducing mortality levels (Habicht, DaVanzo, and Butz, 1988).

In contrast, this study found a stronger association between the source of drinking water and infant mortality than between sanitation and infant mortality, which is in agreement with findings from Brazil (Victora *et al.*, 1988). In this study there are no clear advantages to having a toilet facility in the house. The presence of a toilet may not be a good reflection of household sanitation because 90 percent of households do not own latrines, and those who have them also defecate in the fields. For example, Mohmaddi's mother in Chharroa village in Mewat made the following comments:

> We have a toilet in the house. But we like to defecate in the open field because we are used to the practice and cannot give it up. Moreover, a piece of open land is also nearby and if we defecate in the house it will produce a foul smell which will spoil the clean atmosphere (Field Notes, Mewat, 1996).

Indeed, the lack of relationship between toilet availability and infant survival is not surprising in the Mewat context where few families have access to a toilet. Moreover presence of a toilet provides no indication about use of the facility or its condition, and whether it works properly and safely disposes of excrement.

6.4.3 Type of house

Type of house is significantly related to infant mortality at the univariate level, where the risk of infant death in *kachcha* houses was 1.7 times as high as in *pukka* houses (Table 6.2). However, controlling for other environmental factors simultaneously not only made the effects insignificant but also reversed the relationship (Table 6.3). At the multivariate level the risk of dying for infants from k*achcha* houses was lower than that of infants from *pukka* houses. I could not see any explanation for this except that my small sample size produced unusual results. My field experience suggests that the type of house affects infant mortality mainly through the elements of exposure. The most important health effects of housing conditions on health work through their impact on the incidence of infectious diseases, in particular diarrhoeal diseases. For example non-cemented houses have floors which cannot provide protection from ground water and dampness which increases the incidence of infectious diseases. Particularly problematic are instances where cooking is also done in the living room as many households (67%) do not have a separate kitchen or a designated kitchen area in the housing unit. The situation where a single room is used for day-to-day living, sleeping and also cooking may ultimately produce a health hazard. However, it must also be remembered that the socio-economic conditions of the family are reflected in the type of housing (Khan, 1988). In any case, this issue needs to be resolved with a larger data set.

6.4.4 Persons per room

Room density was significantly related with infant mortality both at the univariate and multivariate level. At the univariate level, children born in relatively crowded houses (more than 3 persons per room) appear to experience a higher risk of mortality during infancy: 3.5 times that of children in less crowded houses (3 or less than 3 persons per room). Even after controlling for other environmental factors simultaneously, the effect was large and statistically significant. At the multivariate level, children born in crowded houses were three times as likely to die as children in less crowded houses.

In India, crowding was found to be positively correlated with the infant mortality rate (Jain, 1985); in Malaysia it increased the risk of dying in infancy (Da Vanzo *et al.*, 1983); in Brazil it was identified as one of the risk factors for infants who died from respiratory infections (Victora *et al.,* 1989), and in Pakistan it was found to be a risk factor for child mortality from respiratory as well as diarrhoeal infection (D'Souza, 1997b). Van Ginneken (1990) reviewed studies from various developing countries and found crowding as one of the risk factors for acute respiratory infection morbidity. Crowding is known to spread communicable diseases: respiratory diseases in general and tuberculosis, rheumatic heart disease, meningitis, pneumonia and the common cold in particular (Pandey *et al.*, 1989). Crowding is thought to adversely affect health and survival through infection by respiratory diseases such as tuberculosis and pneumonia

(Gorosomov, 1968) and through increased contact and transfer by fomites of orally ingested pathogens (Wray, 1971).

6.4.5 Presence of separate kitchen

The presence of a separate kitchen in the household is significantly associated with infant mortality only at the univariate level when children born to households without a separate kitchen are 1.7 times as likely to die as children with a separate kitchen in the house. Controlling for other environmental factors simultaneously reduced the strength of the effect of presence of kitchen and its effect became insignificant. Still, the relative risk of dying in infancy among children of families without a kitchen was 1.2 times as high as that for children in families with a kitchen. Domestic smoke pollution, caused in part by cooking, has been identified as a risk factor associated with both the incidence and severity of respiratory diseases (Anderson, 1978; Kossove, 1982; Honicky, Osborne and Akpom, 1985; Samet, Marbury and Spengler, 1987; Chen *et al.*, 1990; Collings, Sithole and Martin, 1990; Awasthi, Glick and Fletcher, 1996). Respiratory diseases are estimated to be responsible for 23 percent of deaths of in preschool children in India (Reddiah and Kapoor, 1988). Moreover, pollution increases within the house if cooking is also done in the living room (DaVanzo, 1984; Pandey *et al.*, 1989).

As mentioned in Section 6.3, many houses do not have a separate kitchen. Women often cook under poorly ventilated conditions using open U-shaped stoves, called *chulhas*. These stoves use biomass inefficiently and release high volumes of noxious air pollutants indoors. Extended exposure to high levels of these air pollutants can impair the cleaning ability of the lungs and render them more susceptible to infection. The negative health effects of these pollutants are particularly severe for very young children who tend to stay indoors and are often carried on their mothers' back or laps while their mothers are cooking (Mishra and Retherford, 1997).

6.4.6 Presence of separate bathroom

The presence of a separate bathroom is not significantly associated with infant mortality. The reason may be lack of variation in this variable. Only 30 percent of children live in houses with a separate bathroom. Those who have this facility may not use it. It was observed during the field survey that men and children bathe at the village well. The women bathe in the courtyard behind screens of cots placed on edge. Infants are bathed by their mother in a broad and round iron pan called *tasala* and the water is thrown out into the street or into the courtyard.

6.4.7 Type of cooking fuel

Although the type of cooking fuel is not statistically significant in its relation to infant mortality, the sign of the coefficient implies that cooking fuel is inversely related to infant mortality. Children of families using cleaner fuel had a lower risk of death than children whose families did not. In Mewat around 93 percent of children live in households using biomass fuels (cowdung cake or firewood) for cooking. The type of fuel in combination with the absence of a separate kitchen releases the smoke indoors, thus polluting the area inside the house. Moreover, fires from biomass fuels require more or less continual feeding, resulting in extended exposure to noxious indoor pollutants (Mishra and Retherford, 1997). This is a great health hazard especially for eyes, which are continuously exposed to the smoke.

6.4.8 Refuse in the courtyard

Place of refuse disposal was significantly associated with infant mortality both at the univariate and multivariate level. At the univariate level (Table 6.2), the risk of mortality was 2.5 times as high if the refuse was dumped in the courtyard compared to households, which did not do so. Controlling for other environmental factors simultaneously did not change the effect of this variable. At the multivariate level, infants born in families where refuse is kept in the courtyard are 2.3 times as likely to die as children in families where the courtyard is free from refuse.

These results are similar to those found in Pakistan (D'Souza, 1997a), in Congo (Mock *et al.,* 1993) and in Bangladesh (Alam, Wojtyniak and Rahman, 1989; Baltazar and Solon, 1989) where refuse disposal was found to be a significant determinant of diarrhoeal disease prevalence. This reflects parents' lack of awareness of hygiene.

Dumping refuse in the courtyard and accumulation of garbage including faecal material around the house were common in this area. In such an environment when an infant starts crawling, it is very likely to contract an infectious disease.

6.4.9 Presence of animals in the courtyard

The presence of animals in the courtyard shows a significant gross effect which increases when controls for other environmental variables are introduced into the model. In gross terms, the risk of infant mortality in households which keep animals inside the courtyard, was 1.5 times as high as in those which do not. At the multivariate level, the risk of dying in infancy was 1.6 times as high for children in houses where animals are kept inside the courtyard as in houses where they are not.

The presence of animals and the place where they are kept may contribute to environmental pollution and increase the child's exposure to it; it may also indicate the family's lack of knowledge of hygiene and its effect on the health of children (D'Souza, 1997a). In the absence of proper drainage and sanitary facilities, animal stools and urine litter the surroundings. When infants and children walk around barefoot in these surroundings, they are exposed to the risk of hookworm and other parasitic diseases (Khan, 1988).

6.5 Parameter estimates for a final hazards model

The final multivariate hazards model incorporates the 'best' mortality predictor from each of the three theoretical aspects, demographic-cultural, socio-economic and environmental. This is done with two aims. First, household environmental contamination variables are considered to be the direct causal variables that influence infant and child mortality (Merrick, 1985). As postulated in Mosley and Chen's (1984) theoretical model, socio-economic factors directly affect the level of environmental contamination, a proximate determinant of infant and child mortality, which then affects infant and child survival chances. If that argument holds true, when the effects of environmental factors are controlled, the effect of socio-economic factors will be diminished. If the effect of socio-economic variables on mortality hazards is simply that infants in better socio-economic conditions (ownership of land and father not working as a labourer) live in more favourable environmental conditions, the effects of socio-economic variables should disappear once the environmental covariates are controlled for. The second purpose is to see whether maternal and cultural factors which are other proximate determinants of infant mortality, still retain their importance when the environmental factors are also added to the model. In short, the main purpose of this exercise is to identify the key factors which influence infant mortality in this particular setting.

In the final model adjustments were made for the effects of socio-economic factors (father's occupation and ownership of land) and demographic and cultural factors (maternal age at birth, preceding birth interval, survival of the previous child, and utilisation of colostrum) (Model 3, Table 6.4). Model 3 contained all covariates listed in Table 6.3 that were significantly associated ($p<0.01$) with infant mortality, with the addition of socio-economic, demographic and cultural covariates to the model.

The data seem to support the kind of conjectures discussed above. After controlling for environmental, demographic and cultural factors simultaneously, the effect of socio-economic variables was diminished. Children in households with land and with fathers not working as labourers are not more likely to survive with similar environmental hazards and maternal and cultural factors. The results from the hazards model analysis (Table 6.4) seem to suggest that high socio-economic status does not give a survival advantage for children, and the effects of socio-economic determinants on infant mortality are indirect.

On the other hand, room density, and disposal of refuse were still significant environmental factors when these controls were made. Maternal age at birth and utilisation of colostrum also remained significant. This lack of a significant influence of socio-economic variables (occupation of father, and ownership of land) on infant mortality when the environmental, maternal and cultural variables were controlled is in accord with the findings of some studies in rural Bangladesh (Chowdhury, 1982; Phillips and Mozumder, 1984) which stated that socio-economic level had no significant effect on post-neonatal mortality. Education of mother was also included in another model

Table 6.4 Summary results[a] from Cox proportional hazards model for the effect of environmental, socio-economic, demographic, and cultural factors on infant mortality: Model 3[b] (Multivariate model), Mewat, 1996

Covariates	Regression coefficient β	Exp (β)	SE	95% confidence interval
Persons per room				
3 or less	0.0000	1.0000		
More than 3	1.1037***	3.0154	0.3001	1.6744- 5.4302
Refuse in the courtyard				
No	0.0000	1.0000		
Yes	0.8947**	2.4467	0.3048	1.3462- 4.4469
Animals in the courtyard				
No	0.0000	0.0000		
Yes	0.2850	1.3298	0.2337	0.8412- 2.1023
Father working as labourer				
No	0.0000	1.0000		
Yes	0.0126	1.0127	0.2524	0.6175- 1.6606
Owning any land				
Yes	0.0000	1.0000		
No	0.0426	1.0436	0.3102	0.5681- 1.9169
Maternal age at birth				
20 + years	0.0000	1.0000		
Under 20 years	1.2333***	3.4324	0.2521	2.0941- 5.6258
Preceding birth interval				
24+ months & 1st births	0.0000	1.0000		
Less than 24 months	0.3668	1.4432	0.2646	0.8592- 2.4242
Survival of previous child				
Alive & 1st births	0.0000	1.0000		
Dead	0.4943	1.6393	0.3358	0.8488- 3.1661
Utilisation of colostrum				
Yes	0.0000	1.0000		
No	1.1394***	3.1248	0.3199	1.6692- 5.8497

Source: Mewat field data, 1996

Notes: [a]Results based on a total of 950 cases: 83 died during infancy; 867 either survived the infancy period or were censored at survey date.

[b]Model contained all covariates listed in Table 6.3 that were significantly associated ($p<0.10$) with infant mortality, with addition of socio-economic, demographic and cultural covariates to model.

**P<0.001

***p<0.000

(results not shown) along with all the variables in Model 3. Again it was not found to be significantly related to infant mortality. The finding that education of mother was not related significantly to infant mortality was in contrast to findings in Amman (Tekce and Shorter, 1984), Nepal (Pant, 1991), Bangladesh (Stanton and Clemens, 1987) and Nigeria (Chojnacka and Adegbola, 1984). It is possible that the general level of environmental hygiene in this area is so bad that an individual's education may produce negligible health impacts. This interpretation is consistent with the fact that refuse disposal in this sample is associated with infant mortality because refuse disposal is usually correlated with overall environmental hygiene, so it is a better differentiating factor (Mock *et al.*, 1993). Moreover, education itself, without resources, may not be important as a factor for lowering infant and child mortality (Pant, 1991) and the positive effects of maternal education are usually greater when accompanied by better hygienic practices and access to potable water and toilets (D'Souza, 1997a).

Thus, the analysis of Mewat field data 1996 supports Mosley and Chen's (1984) theoretical framework. In accordance with the model, socio-economic variables in this data set have indirect effects on infant mortality, while maternal, cultural and environmental variables directly influence infant mortality. Among all the covariates, maternal age has the most significant and the greatest net effect on infant mortality. Teenage mothers experience higher risks of infant mortality than older mothers; the reasons for this are described in Chapters Four and Five. Utilisation of colostrum emerged as the second most important factor after maternal age at birth. As has been described in Chapters Four and Five, in Mewat the initiation of breastfeeding is delayed, thereby depriving the infant of valuable colostrum. The effects of the preceding birth interval and survival status of the previous child on infant mortality, although not statistically significant at the p=0.10 level, are in the expected direction, thus providing substantive, if not statistically significant support for Mosley and Chen's framework.

The hazards analysis also indicates that crowding and refuse disposal are important environmental covariates of infant mortality in Mewat. These results suggest that personal hygiene behaviour and poverty affect infant mortality. Dumping refuse in the living area reflects parents's lack of awareness of hygiene, while crowding is a consequence of poverty.

6.6 Summary

The results of this study provide empirical evidence for a variety of associations between household environmental factors and infant mortality. Hazards analysis suggests that crowding, refuse disposal and location of cattleshed are important correlates of infant mortality in Mewat. The children with a low risk of mortality are those who live in less crowded households which do not keep animals in the courtyard or dispose of refuse in the courtyard.

The main explanations for the relative lack of association of presence of latrine, separate bathroom and type of cooking fuel with infant mortality are that these variables measured only indirectly the quality of environment, and there is little variability in this sample with respect to these factors. Refuse disposal and presence of cattle inside the courtyard are direct and better measures of environmental hygiene, and are significantly related to infant survival.

Finally, the data support Mosley and Chen's theoretical framework. In accordance with the model, socio-economic variables in this data set have indirect effects on infant mortality, while maternal, cultural and environmental variables directly influence infant mortality. In order of importance, maternal age at birth, utilisation of colostrum, crowding and disposal of refuse are the most important determinants of infant mortality in Mewat.

CHAPTER SEVEN

INFANT MORTALITY IN MEWAT: DIFFERENCES BETWEEN MEOS AND THEIR NEIGHBOURS

7.1 Introduction

The infant mortality rate 'is regarded as one of the most revealing measures of how well a society is meeting the needs of its people' (Newland, 1981: 5). In comparisons of groups within a society, as well as comparisons among societies, it is considered an indicator of deprivation (Cramer, 1987). Even as infant mortality has shown substantial declines over time, differences in infant mortality across different groups persist. Many studies have identified racial and ethnic differences in infant mortality (Eberstein and Parker, 1984; Rogers, 1984, 89a, b; Baldwin, 1986; Cramer, 1987; Eberstein, Nam and Terrie, 1987; Keith and Smith, 1988; Powell-Griner, 1988; Boone, 1989; Rumbaut and Weeks, 1989; Collins and David, 1990; Paneth, 1990; Yankauer, 1990; David and Collins, 1991; Geronimus, 1992; Hummer, Eberstein and Nam, 1992; LaVeist, 1992; Schoendorf *et al.*, 1992; Wise and Pursely, 1992; Hummer, 1993; Kallan, 1993; Panis and Lillard, 1995; Stockwell and Goza, 1996).

The question is whether ethnic variations in infant mortality reflect differences in socio-economic and demographic characteristics or ethnicity *per se*? The role of demographic and socio-economic characteristics and the cultural label of ethnicity in contributing to ethnic differences in infant mortality have been alluded to in the literature. However, the relative effects of ethnicity *per se* independent of socio-economic and demographic factors on infant mortality has not been thoroughly probed. This chapter assesses the relative contributions of socio-economic and demographic factors and ethnicity to the explanations of infant mortality differentials between Meos and Non-Meos in Mewat. It addresses the following specific issues: to what extent is there variation in infant mortality between Meos and Non-Meos? And to what should these differences, if there are indeed differences be attributed?

To assist policy-makers, it is essential to ascertain whether ethnic infant mortality variations are the result of demographic, socio-economic, and environmental disparity among the groups, or whether such differences reflect the values of the cultural groups. If ethnic differences in infant mortality can be attributed to demographic and socio-economic characteristics, rather than to ethnicity itself, then infant mortality reduction programs can be targeted to compensate for the differences between groups in traits such as education, employment and age at marriage. If, however, ethnicity itself is an obstacle to infant survival, then a culturally-based barrier may exist, in which case simply expanding the availability of health services or altering socio-economic conditions of people may do little towards enhancing child survival.

This chapter has been divided into two parts. The first part examines infant mortality differentials between Meos and Non-Meos, controlling for various demographic, socio-economic and environmental factors to determine how much of the ethnic gap in infant mortality is due to demographic, socio-economic and environmental factors. The second part provides further insights into ethnic differentials in the use of health services, which may contribute to infant mortality differentials between the two communities. Qualitative data are used extensively to understand the health utilisation pattern of the two communities. The central hypothesis of this chapter is that, since Meos and Non-Meos have similar cultural background and attachments, ethnicity *per se* will not be a strong predictor of infant survival after the relevant socio-economic and demographic characteristics have been controlled. Appendices A 7.1 to A7.3 provide distribution of live births between Meos and Non-Meos by categories of independent demographic, socio-economic and environmental variables. Appendices A 7.4 to A 7.7 provide detailed results of various models used in this study.

7.2 Theoretical background

Generally group differences in mortality have been explained by social characteristics. This hypothesis emphasises differences in socio-economic and demographic characteristics as the main cause of observed differences in mortality. The major thrust of this thesis is that the effect of ethnic membership on mortality differentials merely reflects socio-economic and demographic differences between the members of different ethnic groups. The basic assumption is that irrespective of ethnic background, people who possess the same socio-economic and demographic characteristics should have similar mortality experiences. Ethnic differences in mortality are seen as resulting solely from socio-economic and demographic differences in levels of earnings and in propensity to obtain medical care (Panis and Lillard, 1995). Therefore, once differences in the pertinent social, demographic, familial, and economic characteristics are eliminated through statistical controls, mortality variations among the ethnic populations should disappear (Mott and Haurin, 1985; Mare, 1990; Rogers, 1992). This hypothesis seems likely to be valid because race or ethnicity is confounded with social and economic status (Navarro, 1990).

7.3 Analytical approach

To achieve the objectives of this chapter, Cox proportional hazards models were fitted to determine differentials in relative risk of dying in infancy between Meo and Non-Meo infants. First, a Cox's proportional hazard regression model (Table 7.1) was fitted to examine the gross effect of ethnicity on infant mortality. Second, four multivariate models were estimated. Model 1[1] (Table 7.2) estimates the ethnic differences in infant mortality after controlling for demographic factors. Model 2 estimates the ethnic differences after controlling for the demographic and socio-economic factors. Model 3 achieves the same objective after controlling for the demographic and environmental factors, and Model 4 controls for all the significant demographic, socio-economic and environmental factors simultaneously. The independent variable for this analysis is ethnicity categorised as Meo and Non-Meo. The Non-Meo is the reference group. The demographic, socio-economic and environmental characteristics selected as control variables are (a) Maternal age at birth, preceding birth interval, survival of preceding child and utilisation of colostrum; (b) Ownership of land and father working as labourer; and (c) Number of persons per room, refuse disposal in the courtyard and animals in the courtyard. Each predictor has been selected for inclusion for explicit theoretical reasons, and its importance as a determinant of infant mortality in Mewat. All the factors included have a significant effect on infant mortality in Mewat.

7.3 Results

A univariate proportional hazard model is presented in Table 7.1. It shows that there is no significant difference between Meos and Non-Meos in infant mortality. However Meo infants are 32 percent more likely to die than Non-Meos. To assess the relative effects of ethnicity and selected characteristics variables on infant mortality in Mewat, controls were introduced. The results presented in Table 7.2 (Model 1 to Model 4) show the effect of controlling for explanatory variables separately and simultaneously on the differences in infant mortality between the two communities of Mewat. Comparisons of these models allow a number of important questions to be addressed. Models 1 to 3 show how much ethnic differences in infant mortality are affected by demographic, maternal health and cultural factors, and socio-economic and environmental factors. Finally, the full Model (Model 4) shows how much the ethnicity gap in mortality is affected by the combined demographic, socio-economic and environmental factors.

Table 7.1 Summary results from Cox proportional hazards model for the effect of ethnicity on infant mortality, Mewat, 1996

Covariates	Regression coefficient β	Exp (β)	SE	95% confidence interval
Ethnicity				
Non-Meos	0.0000	1.0000		
Meos	0.1904	1.3207	0.2285	0.7730 - 1.8931

Source: Mewat field data, 1996

[1] For detailed results of Model 1, see Appendix A 7.4; Model 2, Appendix A7.5; Model 3, Appendix 7.6; Model 4, Appendix 7.7.

Model 1 shows that if only demographic factors are considered, the risk of dying for Meo infants is 30 percent higher than that for Non-Meo infants. Controlling for demographic and socio-economic (Model 2)[2] and demographic and environmental factors (Model 3) reduces the difference between Meos and Non-Meos in infant mortality. In these cases Meos are 24 percent and 19 percent respectively more likely than Non-Meos to die in infancy. Controlling simultaneously for demographic, socio-economic and environmental factors (Model 4), the relative risk of infant death is only 10 percent higher for Meo infants than for Non-Meo infants. Since the Meo and Non-Meo differences in mortality reduces substantially when socio-economic and environmental factors are controlled, as in Model 2 and Model 3, the ethnic disparity is due to these factors.

Table 7.2 Relative risk of dying in infancy among Meos and Non-Meos controlling for other characteristics, Mewat, 1996

Covariates	(Model 1) Only demographic	(Model 2) Demographic and socio-economic	(Model 3) Demographic and environment	(Model 4) All covariates: demographic, socio-economic and environment
Ethnicity				
Non-Meos	1.0000	1.0000	1.0000	1.0000
Meos	1.3072	1.2475	1.1999	1.1044

Source: Mewat field data, 1996

Notes: Model 1 includes ethnicity, maternal age at birth, preceding birth interval, survival of previous birth and utilisation of colostrum. Model 2 includes all variables in Model 1 with the addition of ownership of land and father's occupation. Model 3 includes all variables listed in Model 1 with the addition of room density, refuse disposal and animals in the courtyard. Model 4 is a net model which comprises all the above variables.

The results also show that infants born to younger mothers (less than 20 years), in crowded households and in households which dispose of refuse in the courtyard, experience higher infant mortality than those not born with these characteristics. But

[2] Controlling for the socio-economic and environmental variables separately (Appendices 7.8 and 7.9) eliminates ethnic differences in infant mortality. Rather in these cases Meo infants are less likely to die than Non-Meos infants.

Meo children are more likely than Non-Meos to be born to young mothers, in households which dispose of refuse in the courtyard (Appendices A7.1 to A7.3).

Thus, the findings tend to provide empirical evidence which is partly congruent with the social characteristics hypothesis. The analysis indicates that ethnicity *per se* does not have an effect on infant survival. Perhaps the most common explanation for Meos' high rates of infant mortality is their low socio-economic status and poor household environment. Therefore, if Meos could improve their socio-economic status and also improve their physical household environment by practising better hygiene, they could reduce their infant mortality concomitantly. The results also demonstrate that crowding, which is a consequence of poverty, increases the risk of infant mortality. Amir-Ali's (1970) description indicates the scarcity of accommodation among Meos, which prevents couples from having a room to themselves:

> The married and even the newly wedded are not provided the seclusion of a separate room for sleeping. The community just does not recognise the need for such seclusion. The husband sleeps outside with the several male members and the wife with the numerous females and children of the household.
>
> Every time a husband wants privacy with his wife a rendezvous has to be arranged in advance and this only adds zest to conjugal relations.
>
> A more convenient and more frequent practice is that husbands manage to catch hold of their wives in the secluded parts of the field where the presence of both, for agricultural operations, arouse no attention (Amir-Ali, 1970: 139).

This description establishes the fact that Meos houses are overcrowded. The joint family system is prevalent among Meos, but among Non-Meos certain measures are taken to meet the requirements of married couples. Construction of rooms in the upper storey of the house *(chobara)* is an example. Moreover, among Non-Meos joint families are giving way to nuclear families. In the houses which are already crowded and where cattle have no separate place, the contaminated environment increases the risk of death.

These findings have important policy implications. To increase child survival, strategies are needed for improving socio-economic conditions, especially to increase education and employment opportunities. Social programs for education and employment could diminish these hazards. It also implies that infant mortality among Meos could be reduced by reducing poverty and accompanying overcrowding, poor housing, inadequate sanitation, and unhygienic conditions. People could be taught about proper disposal of refuse: this would help transform the unhealthy environment into a healthy one. *Anganwadi Workers* selected from the cultural communities could play a vital role in assuring people of the benefits of a healthy environment.

7.5 Further insights into infant mortality differentials

The previous section examined ethnic disparities in infant mortality, controlling for demographic, socio-economic and environmental factors, and demonstrated that Meo infants have a higher risk of mortality than Non-Meos. The results demonstrated that once demographic, socio-economic and environmental factors are controlled for, the infant mortality gap between Meos and Non-Meos is substantially reduced. This section provides further insights into infant mortality differentials between Meos and Non-Meos. Part of the information used in this section was gathered through observations, informal discussions and interviews with a cross-section of purposively selected informants in Mewat and also a subset of the Mewat survey. As mentioned in Chapter Three, every fifth household from the original sample was visited to get information on delivery of Integrated Child Development Services and actual use of services. This information is used to examine the use of health care services by Meos and Non-Meos in the specific cultural context of Mewat. In doing so, I have directed attention to both providers and health-care recipients. It is important to mention that all these services are provided under ICDS free of cost; so the price does not affect the use of these services.

7.5.1 Utilisation of maternal health services

This subsection examines the differences, if any, in the level of use of maternal and child care services in the two communities. Maternal care factors cover matters related to pregnancy. Variables examined in this study are ever use of ICDS services, ante-natal care during pregnancy, tetanus toxoid injection during pregnancy, iron and folic acid tablets during pregnancy, use of referral services and Health and Nutrition Education (HNE) for women. Child care services include immunisation coverage and health service utilisation. Table 7.3 indicates the mothers' use of maternal health services.

Table 7.3 Percentage distribution of mothers by selected maternal health factors, Mewat, 1996

Explanatory variables	Non-Meos	Meos
Ever use of ICDS services		
Yes	56.3 (17)	46.0 (23)
No	43.7 (14)	54.0 (27)
Received ante-natal care		
Yes	68.8 (22)	48.0 (24)
No	31.2 (10)	52.0 (26)
Received tetanus toxoid injection		
Yes	62.5 (20)	44.0 (22)
No	37.5 (12)	56.0 (28)
Received iron and folic tablets		
Yes	59.4 (19)	42.0 (21)
No	40.6 (13)	58.0 (29)

Source: Subset of Mewat field data, 1996
Note: Figures in parentheses are total number of women.

Two things are clear from Table 7.3. First, all maternal health services are used more by Non-Meos than by Meos. Second, among Non-Meos, the proportion of women using any service is higher than those not using, while for Meos the reverse is true. Thus, low level of use of health services may be one of the reasons for the higher mortality rate among Meo infants. Since all these services are provided under ICDS free of charge, why is Meo use of the services low ? One reason for this could be the use of alternative sources of maternal and health services, such as dispensaries and private doctors. But other sources are expensive and far away and Meos being poor and less educated are unlikely to use these sources.

The information obtained from informal interviews with some Meo mothers and health providers (*Anganwadi Workers,* Child Development Project Officer and doctors) in Mewat identifies a number of underlying causes for non-use of maternal health services by Meo women. Physical inability to walk long distances, heavy work burdens, ignorance, inadequate understanding of, and concern for, maternal health, and certain attitudes and practices towards prenatal care and delivery are the main impediments to obtaining the benefits of maternal health services at *Anganwadi* centre.

As shown in Chapter Three, the literacy level is very low among Meos. Because of low levels of education, Meo women have an inadequate understanding of pregnancy, childbirth and maternal health. In general, they did not see ante-natal care as important: they felt that they did not need it since they thought that ante-natal care was meant only for women who had had difficult previous pregnancies or had some apparent health problem. Rehana, a mother of seven children said:

> I did not go to ante-natal check up because I never had any problems with any of my pregnancies. But my sister-in-law nearly died during her first delivery. Hence, she had to go for ante-natal care (Field Notes, Mewat, 1996).

'I don't have any health problem, why should I go for ante-natal care?' or 'I look fine, I need not go for ante-natal care' or 'Ante natal care is the privilege of the well-to-do who don't have anything to do' were the common replies from pregnant Meo women to questions about ante natal care. Among major reasons for not going to the *Anganwadi* for ante-natal care were unsuitable timings and distance. Since the health worker comes during the daytime and that is also the work time for the clients, they find it difficult to make up for time lost during visits to the *Anganwadi* centre. They did not contact the health worker because the centre was too distant from their houses. One woman's comments reflect the typical view of the AWW:

> She comes, she write things down. She tells us to do this and that. What benefit is there to us? She asks us to come to the AW for injection on a particular day. That day is decided according to their convenience. Who will do our work if we go there?

Another woman remarked: 'It is her job to come here. I do not mind. But when we are sick, there is nothing she can do'.

But the *Anganwadi Workers* have their own stories to tell. Women get quite disappointed on finding that performing curative services is not the *Anganwadi Worker's* major job. One *Anganwadi Worker* related:

> Sometimes they get cross. When I measured one woman's child's arm with the arm circumference measuring tape we saw the child looked undernourished as he was too thin. She got angry and said 'Then why don't you do something? You come to show me my child is not good like this and then you do nothing!' (Field Notes, Mewat, 1996).

Of course the AWW is supposed to deliver nutrition education, but this is obviously not what the village woman had in mind.

7.5.2 Place of delivery and assistance during delivery

Table 7.4 presents the percentage distribution of the children according to maternal health factors. About 86 percent of the total births to Meo and 76 percent to Non-Meos respectively took place at home. A professional (doctor, nurse, Auxilary Nurse Midwife), delivered about 24 percent of the Meo babies; the rest were delivered by *dais*, relatives, and friends or the births were unattended. In contrast, among Non-Meos, professionals delivered around 37 percent of babies. Similarly, scissors were used to cut the umbilical cord in more than half of total births to Non-Meos, while in the case of Meos, scissors were used for this purpose in only 34 percent of births. Thus, most of the deliveries to Meo women took place at home, attended by non-professionals, and blades or knives or even sickles were used to cut the umbilical cord.

Table 7.4 Percentage distribution of the births between 1993 and 1996 to Meos and Non-Meos by selected maternal health factors, Mewat, 1996

Explanatory variables	Non-Meos	Meos
Place of delivery		
Hospital	23.5 (91)	13.9 (78)
Home	76.5 (296)	86.1 (485)
χ^2	.000	
Assistance at delivery		
Professional	36.4 (141)	24.0 (135)
Others (TBA, relatives & friends and none)	63.6 (246)	76.0 (428)
χ^2	.000	
Instrument for cutting the cord		
Scissors	55.0 (213)	33.6 (189)
Blade/ knife/ sickle	45.0 (174)	66.4 (374)
χ^2	.000	

Source: Mewat field data, 1996
Notes: Figures in parentheses are total number of births.

These finding have been confirmed by the discussions with the health personnel and other informants in Mewat. The findings in Table 7.4 reinforce those in Table 7.3. Because

Non-Meos make more use of ante-natal health services, they make more use of institutional facilities for deliveries. A wide variety of maternity and nursing homes are available in the nearby towns of Nuh and Taoru. Moreover, Non-Meos are also making use of maternity homes in Gurgaon City, which requires long-distance travel and money. These maternity homes are quite expensive but more Non-Meos than Meos are ready to pay for them.

In contrast, Meos make less use of the institutional services for childbirth or for ante-natal care. Although there is a tendency throughout Mewat, as in other rural areas of India, to have home deliveries (Chapter Four), whereas Non-Meos have started making use of institutional facilities for deliveries, Meos still depend so much on *dais* that even high-risk patients are not brought to facilities because *dais* fail to recognise such cases before the onset of the complications. Once complications develop during labour, it is usually impossible for the women to be transferred to the health centre because of distance and lack of transport in rural areas. Moreover, home deliveries are not necessarily performed by *dais:* relatives available at home may provide immediate help. In such situations, there is a possibilities of infections, unhygienic conditions, and lack of proper ante-natal and post-natal care and treatment. The infant mortality rate is likely to be higher in such situations.

Some frequently mentioned obstacles to hospital deliveries are transport difficulties (lack of vehicles, impassable roads, distance from maternity home), poor treatment from health providers, cost (transport and hospital) and fear of operations. Although most Meo deliveries occurred at home, some women did go to maternity homes for deliveries, or called health personnel to the home. Some Meo women said that they would seek hospital services if they were 'affordable' and 'conveniently located'.

A commonly mentioned disadvantage of having a baby in the hospital was the high fees at maternity homes compared to nominal payments to *dais* and the discrepancy between the official and actual costs of some services there. One Meo woman said:

> A *dai* is happy to accept 10-15 rupees, but in a hospital you have to give around 15 rupees' tip to each and every staff member, and the doctor's fee and hospital charges on top of that. Moreover, you have to provide medicines and sanitary pads and the list is long. If you don't provide these things, you will have to pay for them. Nurses will have a bad attitude towards you and if you don't have the money to pay for drugs, they will scold you (Field Notes, Mewat, 1996).

Fear of operations was another reason cited for the high incidence of home deliveries. Women may have to go to maternity homes in the case of complications and they may experience surgery. They do not like to think of this before the birth because thinking about it may cause complications. Many believed that doctors deliver babies only by Caesarean section, and that doctors at maternity homes deliberately perform operations in order to increase the cost. According to one Meo woman (aged 56):

> We never heard about child birth by operation in our time. In fact, we never thought of going to hospital for delivering a baby (*baccha jenene*). But now they have started going to hospitals for child birth and get their bellies cut. These lady doctors (*docterne*) cannot wait, rather they will cut the bellies and finish their work. It takes less time for them but they make a lot of money (Field Notes, Mewat, 1996).

Explaining the reason for consulting a *dai* in preference to a Lady Health Visitor (LHV) Rahilla, a Meo woman, said:

> We don't object to having babies delivered by any one. However, it's a problem to get to them (health professionals) when labour begins. At that time nobody except a *dai* is available. I used to get my checkup every month from this LHV and it would have been better to get my child delivered by her. The pains started at night. My husband came here to call her. But this LHV refused to come and I had to have the baby delivered by the village *dai*. Because the case was serious, the baby died.
> The *dais* belong to the village. When a *dai* is needed we can call her easily. We don't have any transport for going to the hospital. If the labour pains start at night, how can we go there without conveyance? The *dai* is right on the spot, we can call her (Field Notes, Mewat, 1996).

Even when the services of a professional are available, many women prefer the services of a local *dai*. During the survey, I realised that reasons given for preference for a local *dai* had little to do with scarcity of hospitals and maternity clinics. The women's perception of the local *dai's* experience, kindness, skill and interest in the welfare of the baby attracted them toward *dai*s. Mothers preferred *dais* because they were easily accessible, friendly and kind during delivery, and less expensive than a hospital delivery. Women and *dais* share similar ideas about childbirth. Apart from delivering babies, *dais* massage the mother soon after delivery, and provide post-natal care for the first elevan days. These additional services and a perceived socio-cultural similarity may explain women's preference for a TBA even when modern facilities are accessible. The experience of the Meo women with hospital delivery is not a pleasant one. Kani's story will explain the problem faced by the Meo women in hospital.

> Kani, aged 55 years lives in the village with her husband. She had four sons and three daughters, all of them married and had children. Three of her sons are settled in the nearby town of Sohna. Her youngest son aged 18 years is the owner of a dairy. Her youngest daughter-in-law conceived within a year of marriage. She took her for delivery to a very reputable and expensive maternity home in Gurgaon City. Here is her experience:
>
> It was the hot month of May. The labour started around seven o'clock in the morning. May be a bit earlier but I came to know around seven. Since my son is rich enough to afford a hospital delivery, we took her (daughter-in-law) around half past eight to the Mahajan Hospital in Gurgaon. The doctor had not yet arrived. We asked the nurse to inform the doctor about the case but she paid no attention and she did not give us an air-conditioned room even though we had money. (There are only two air-conditioned rooms in the hospital and additional money is paid for those rooms). The nurse said that those rooms were already booked, but no one had arrived even when we left the hospital. Then the doctor came. She saw us but she didn't examine my daughter-in-law first, but another lady who arrived after us was seen first (this another lady was a Non-Meo). Then she took my daughter-in-law to the labour room. I wanted to go inside, but she said that you would contaminate the environment as you don't wash your head often (Meo women have their hair plaited by the village *nan* (female barber) once a month when they take a hair wash). I told her that we don't have *chunda* (plait on the top of the head, which is made once a month) and we are paying money for the delivery. It was only after a lot of effort that I was allowed to enter the labour room (Field Notes, Mewat, 1996).

The two cases of Rahilla and Koni's daughter-in-law indicate that Meos are accepting hospitals because of their desire for the birth to take place in a healthy environment. However, besides the hospital costs, which include fees for service, transport, medicines and equipment, and time lost from activities for the patient and family members - the other major barrier to childbirth in hospital is that hospital staff are unavailable or disrespectful and some qualified doctors are unwilling to treat patients coming from a different ethnic background (Meos can be recognised by their attire). Not only are the health staff generally more educated and wealthier, but there may be ethnic differences. Families are less willing to accept the financial burden of hospital for adults and children when they feel poorly treated by medical personnel.

7.5.3 Child health care

7.5.3.1 Immunisation

Immunisation against the major childhood diseases, tuberculosis, diphtheria, poliomyelitis, whooping cough and measles, can greatly enhance child survival. Child immunisation coverage with any type of vaccine was higher for Non-Meo children than for Meo children. The immunisation coverage levels among Non-Meo children were almost similar to the average for Haryana State as a whole and in the case of polio vaccine, higher than the state average (IIPS, 1995a). However, the level of immunisation coverage among Meo children was lower than the state average for each of the vaccines.

Table 7.5 Immunisation and health check up of children, Mewat, 1996

Explanatory variables	Non-Meos		Meos	
	Yes	No	Yes	No
Type of vaccination				
BCG	75.0 (56)	25.0 (18)	65.0 (72)	35.0 (38)
Polio	80.0 (59)	20.0 (15)	70.0 (77)	30.0 (33)
DPT- 1st dose	76.0 (56)	24.0 (18)	65.0 (72)	35.0 (38)
DPT-2nd dose	65.0 (48)	35.0 (26)	60.0 (66)	40.0 (44)
DPT-3rd dose	61.0 (45)	39.0 (29)	56.0 (62)	44.0 (48)
Measles	59.0 (44)	41.0 (30)	51.0 (56)	49.0 (54)
DPT booster	47.0 (35)	53.0 (39)	25.0 (27)	75.0 (63)
Regular health check up	28.0 (21)	72.0 (53)	19.0 (21)	81.0 (89)
Irregular health check up	43.0 (32)	57.0 (42)	34.0 (38)	66.0 (72)

Source: Subset Mewat field data, 1996
Notes: Figures in parenthesis are total number of births.

Why do Meo children have lower levels of immunisation despite the fact that all but one village surveyed had an *Anganwadi* centre where the health worker comes on a fixed day to immunise children? Long distances to the nearest health facility, frequent shortages of the relevant vaccines and the heavy domestic workloads of the Meo women discourage them from having their children immunised.

Although the day for the immunisation of children is fixed, some Meo mothers complained of being turned away from the *Anganwadi* centre several times because the medical personnel did not turn up or there was no regular supply of vaccines. While Non-Meo parents take their children to the private clinics for immunisation, Meo parents have been discouraged as a result. Once during the field survey the immunisation day coincided with the annual festival of *Sankrat*. During this festival women visit their natal families along with their children. So the attendance of children was very low.

Distance was also given as one of the reasons for low levels of immunisation of Meo children. If the *Anganwadi Worker* (AWW)is not located within a convenient distance, then few people can approach her for various services, even when there is a need. Sometimes the AWW does not have a fixed place of work which also influences the number of people who consult her. Meo women complained that vaccines made their children sick, so most of their children were not immunised. The Child Development Project Officer blamed Meos for not being co-operative and not understanding the positive effect of immunisation. She said:

> If nothing happens to the child, they won't say anything. But if the child gets sick after immunisation, they make a big issue of it. This news that the child is ill because of immunisation spreads like a wild fire in the community and you have to try hard to bring their children for the next dose of vaccine. That is the reason that completed immunisation is still much lower among the Meos (Field Notes, Mewat, 1996).

Another AWW said:

> After hard labour, I convinced one woman to bring her child for immunisation. It was for BCG. Generally, BCG injections gets inflamed. I told her in advance about it. After a week the mother came to me and said that the child was crying because of pain and swelling at the injection site. I kept on repeating that it was normal but she didn't listen to me and said that in future she is not bringing her child again to the centre for an injection (*sui lagwane*) (Field Notes, Mewat, 1996).

7.5.3.2 Perceptions of child illness and treatment

When I surveyed the effectiveness of delivery of ICDS service and asked about morbidity, I met reluctance on the part of Meo families to report that a baby was ill.

Rather than admitting the problem, and seeking medical attention, the families preferred not to think there was a real problem. 'The child is not ill', I would be told in reply to my observation that Anwar had a running nose and bad cough. "That's how things are'. 'It's normal'. I also observed many instances of infantile diarrhoea. In bringing these instances to the mother's attention, I was told that the child's condition was normal. Despite such disclaimers, I could see signs of worry on the mother's face at times. The child's condition was definitely not normal, but the mother or her family members did not want to admit it. That might be the reason for low reporting of illness among Meos in the survey carried out by Amar-Ali (1970). He writes:

> 84% of the respondents reported that they had no illness in their household at the time of answering the questionnaire. This leads one to suspect that there may have been an inhibition against the reporting of illness. The householders might have been unaware of illness in their house-holds or unwilling to mention it for some reasons better known to them. Of the 40 or so cases half pertained to adults and half to children (Amir-Ali, 1970, 134).

Since the Meos do not perceive illness as something serious, they tend to wait longer after the onset of illness than do Non-Meos before seeking treatment. This is particularly true for modern medical care. When Meos finally seek medical treatment for their children, it is usually from a traditional practitioner; only as a last resort do they seek modern medical care. The reasons can be extreme poverty, lack of resources, or social and economic distance between provider and recipient and rudeness of health staff. In fact modern medical care is predominantly Non-Meo care. This was also observed by Amir-Ali:

> Three out of every four respondents said that they had relied on traditional remedies known to their elders and the *Vaids* of the sister communities. Only 15 percent said that they had availed of the Government dispensary...Another question tried to ascertain the reason why Government dispensaries were not more frequently referred to. Seventy five percent said they were too poor to avail of the dispensary. Twenty percent preferred indigenous treatment. Of the remaining, some said the dispensaries were too far and some were uncertain of the effectiveness of the dispensaries (Amir-Ali, 1970, 135).

During my visits to the Primary Health Centre and rural dispensaries in Mewat, I noticed very few Meo children there for treatment. A number of fathers described their children's symptoms to the doctor; that they were Meo fathers was clear from their attire. The fathers were prescribed the drugs according to the doctor's interpretation of the symptoms. In these cases children never saw the doctor, and depending on cost, they may or may not have received the drugs. Even when children were brought to the clinic for treatment, they were not physically examined. The absence of a physical examination can lead to incorrect diagnosis of illness because of inaccurate descriptions of symptoms by persons accompanying sick children.

As mentioned earlier, there is a considerable status difference between Meos and health professionals. This status difference results in a communication gap between doctor and patient and the Meo feels insecure about talking with a high-status, qualified doctor. Hence, they often turn to a Hakims, a *vaidyas* (Ayurvedic practitioner), an *ojha* (a practitioner of magic who, through incantation, exorcises the spirit assumed to cause an illness) or *pir* (religious healers who, by reading selected verses from the Scripture, seek a cure or remedy for an illness). The following remarks reflect the basis of this faith:

> The *hakim* offers immediate and personal services and attention while you have to wait for a long time in overcrowded hospitals. The *hakim* listens very carefully while doctors don't. The *hakim* is a friendly and familiar person, the doctor in the hospital is a stranger or alien to us. I feel that doctors don't pay full attention and sometimes I wish I did not come here. You tell me, what is the point of spending on doctors' fees and on medicines prescribed by them which often do not work? I doubt the effectiveness of the dispensaries (Field Notes, Mewat, 1996).

One mother's experience of visiting the Primary Health Centre:

> After spending two hours to reach the government dispensary as it was too far, I arrived to find the doctor away...on personal leave, attending meetings or arranging transfers to more desirable areas (Field Notes, Mewat, 1996).

While Meos are not using modern medical treatment, they are also not using the referral services under ICDS. Under ICDS the *Anganwadi Worker* is supposed to refer serious cases to hospitals. As regards not using referral services, the Meos indicated dissatisfaction with the services they had received at health centres and complained that the health staff were rude to them and treated them harshly. They also complained that doctors did not accept the referred patients.

However, all the *Anganwadi Workers* claimed that the majority of cases they had referred had reported relief. They also complained that despite being referred, the Meos did not comply with the referral. The doctors working at the PHC and other government dispensaries disagreed that health staff were rude; they said that the referred cases came at the last minute and nothing could be done to save their children. One doctor said:

> They (Meos) don't understand that we are overloaded with work. We are unable to cope with the crowds of patients while the patients feel that their cases have not been sympathetically listened to. We have to see the routine patients and the referred cases are on top of that. If we happened to speak rudely to one of them, it is because of tiredness and overwork. A minority are giving the majority a bad name (Field Notes, Mewat, 1996).

Often cost dictates choices, particularly when clinics, and hospital pharmacies are more expensive than traditional ways of healing and when potential patients are poor (Bose, 1980). In government hospitals and dispensaries all treatment and medicine is free. Despite receiving free treatment, Meos do not seem to have much faith in government controlled health organisations. The majority of those who have visited the PHC or the hospitals are unhappy about the hospital administration and the facilities available there. They believe they do not get proper treatment because of overcrowding. They complain about the behaviour of doctors and nurses. Their grievances are justified. In fact, health-care delivery in Mewat can be typically described in terms of insufficient medical and paramedical staff and unequal access to services. Thus, Meos generally avoid going to hospitals.

As a consequence, Meos tend to delay obtaining treatment from modern health care facilities. I found that delays in obtaining treatment were responsible for a significant number of deaths of Meo children. Furthermore, postponing the initial decision to seek modern medical care was not as significant a factor as transport delays and health service failures. The latter delays were the result of incorrect treatment (not physically examining the children), poor attitude of staff and delays in referral. Besides the unavailability of transport at the time of need, many Meos cannot afford transport costs. Those who are daily wage earners do not like to waste a whole day in a hospital. The Meos do not go to the trained private practitioners because of the high diagnostic fees. 'We are too poor to avail ourselves of the private doctor' was reported quite frequently as a major reason for not using a private practitioner.

There are a number of unqualified private practitioners of traditional and modern therapies in Mewat. Living in the community and being generally respected, these private health care providers are aware of local beliefs and customs. They are more accepted than the government physicians and health workers. Because of their relative accessibility, Meo people use them. The diagnostic fee of these unqualified private doctors is less than that of their trained counterparts, but still higher than those charged by traditional healers (*hakim* and *vaid*). But it is believed that their medicine gives quicker relief. Since men are usually less tolerant of sickness, they are more likely to seek and receive allopathic treatment. Women and children, are more likely to go to traditional healers. Even if they go to a qualified or unqualified doctor, they try to reduce the cost. How they do this was described by a Meo woman (age 29, unmarried, school teacher and social worker):

> For Meos, because of their poverty the primary determinant of health care initiation is cost. Cost includes both the diagnostic fee and the costs of medicine. They don't use the Government health system because they don't feel welcomed there. If they happen to go to a private allopathic practitioner the fee will be paid to two different persons, one to the doctor and the other to the pharmacist, so they will try to reduce the cost by reducing the amount of medicine prescribed by the doctor (they cannot reduce the doctor's fee which is paid in full at the time of examination). This is done in one of two ways: reducing the number of days for which a client uses medicine, or choosing only one or two of the prescribed treatments rather than purchasing all of the medicine (Field Notes, Mewat, 1996).

The low use of modern medical care by the Meos and their choice of modern medicine only as a last resort indicate that modern medical treatment is predominantly Non-Meo care. Non-Meo women were more likely to consult a doctor than Meo women. This may be influenced by the availability of Non-Meo practitioners in Mewat. Non-Meo families were also found to travel further for qualified health care. Access to qualified practitioners, quite distant from their village, was facilitated by extensive Non-Meo familial networks in the rural areas. Many Non-Meos settled in the city but still maintained links with the village, providing easy access to urban health services distant from the village. These relationships are solidified by marriage, since Non-Meos prefer marrying out of Mewat. Conversely, Meos marry within Mewat, and hardly any of them have seen the world outside Mewat.

7.5 Summary

This chapter examined the association between ethnicity and infant mortality through demographic, socio-economic and environmental factors thought to be instrumental. Although no statistical difference was found between Meo and Non-Meo infant mortality, it was higher for Meo children. Most of the gap between Meos and Non-Meos in infant mortality can be traced to the Meos' greater likelihood of being in high-risk categories. Statistical controls for demographic, socio-economic and environmental factors reduce the differences in infant mortality between Meos and Non-Meos, but do not eliminate them completely. However, the findings suggest that if Meos improve their socio-economic status, modify their household environment by more hygienic habits, and increase maternal age at childbirth, their infant mortality should decrease.

The analysis also confirms an important reality: the fruits of health services have not been shared equally by Meos and Non-Meos, even if they are available free. Meo women and children continue to be disadvantaged in the use of health care services. For that reason, infant mortality rates can be expected to differ considerably between Meos and Non-Meos. Rates of infant mortality are often used to gauge the overall quality of life of a population (Morris, 1979; Kent, 1991). The ethnic differential in infant mortality indicates continuing inequality in life chances and quality of life for Meo members of this society. Eliminating the association between ethnicity and infant mortality may involve progressive actions towards eliminating differences in the socio-economic, environmental, maternal health, and health care factors that are also instrumental in the continuation of the mortality differentials.

CHAPTER EIGHT

SUMMARY AND CONCLUSION

8.1 Introduction

In this last chapter of the thesis, the major findings are summarised and placed in the context of the proposed theoretical model. The basic research questions posed at the beginning of the study are reviewed and the attainment of the research objectives assessed. The last section of the chapter discusses the relevant policy implications derived from these findings and highlights possible future directions for research.

This study examined the magnitude and direction of demographic, maternal health, cultural, socio-economic and environmental covariates of infant mortality in Mewat, one of the most backward areas of Haryana State, India. From Mosley and Chen's theoretical framework (1984) and previous research literature on infant and child mortality in developing countries, I formulated a modified mortality model that guides the present study. Based on this model, the study sought to establish the extent to which the socio-economic factors influenced infant mortality through their effects on each other and through maternal, cultural and environmental factors, some of the proximate determinants in Mosley and Chen's model. It also examined the differences between Meos and Non-Meos in infant mortality and the possible reasons for them.

Mewat region was chosen for this study because of the relative scarcity of previous research dealing with infant mortality in this area. Research on infant survival is scarce for Haryana State in general and Mewat region in particular. Mewat region presented an excellent opportunity for studying infant mortality conditions in a poor region of India. The Government of Haryana has declared this region a 'backward region'. Such an investigation was justified because of its policy-relevance, especially in the context of Mewat region which is one of the underprivileged regions of India with little or no information on basic demographic and health indicators. There were no published data on infant mortality in Mewat. The Meo is the ethnic group for which demographic data are particularly lacking. This study, therefore, besides filling the gap in knowledge about infant survival in Mewat region, provides a valuable data set on Mewat. Although it may not represent the whole of Mewat, its findings can, with caution, be broadly generalised.

This thesis used both qualitative and quantitative approaches to data collection. The 1996 Mewat Survey provided the quantitative database for the thesis. Qualitative data consisted of participant observation, informal interviews and in-depth interviews with key functionaries. The combination of the two approaches enabled two important contributions to be made. First, the analysis of the quantitative data set provided an insight into the nature of the relationship between infant mortality and various independent variables, thus establishing the overall patterns and correlates. Second, the qualitative study provided clear insights into the social dynamics and processes in Mewat. Moreover, qualitative data provided empirical explanations of the observed associations among the variables studied. Providing context to observed patterns through qualitative data was one way the study avoided 'the reluctance among many demographers to investigate behavioural processes resulting in the observed patterns of population dynamics' (McNicoll, 1992: 11).

The quality of data obtained in this study is considered satisfactory because many precautions were taken to maintain the quality of data and the data performed well when methods were used to test their reliability and validity. Special efforts were made to minimise age misreporting. Moreover, omissions of reporting of births and deaths are minimised by restricting the present study to recent births, those during the three years preceding the survey.

A multivariate form of life table analysis, a proportional hazard model, developed initially by Cox (1972), was used in this study to analyse the effects of the explanatory variables on infant mortality. Cox regression, which utilises life table concepts, is a powerful tool for dealing with mortality data. It is a statistical method, which uses information from all cases and takes into account specific information on the age at death rather than the proportion dying before a given age. The Cox regression procedure is a technique for the analysis of 'survival data' that measure the time until a certain event happens; in the present study the time until a death occurs. Previous studies using pregnancy history or logistic regression techniques excluded children born less than one year before the survey for analysing infant mortality. Restricting analysis in this way has the disadvantage of ignoring substantial amounts of recent information. Exclusion of recent information also means that it is difficult to describe the dynamics of recent social and demographic changes. The Cox regression method overcomes such difficulties by using information from all cases in the recent period.

In this study both univariate and multivariate models were constructed within each of the three theoretical aspects (demographic, maternal health and cultural; socio-economic; and environmental covariates). The univariate hazard analysis was mainly designed to identify the covariates most significantly associated with infant mortality within each theoretical area. Then multivariate analysis was conducted to see the net effect of variables within each of these groups. A variable was considered significantly associated with mortality when its p value was below 0.10. This relatively low significance level was chosen instead of the usual 0.05 in order not to miss any possible variables associated with infant mortality. The -2 log likelihood ratio test was used to examine the strength of the association between a particular independent variable and a dependent variable.

The dependent variable used in the hazards model analysis was infant survival time which was measured as the duration in months starting from the infant birth to death (if the event occurred), or from the infant birth to survey date (censored data). The independent variables used in this thesis fell into three broad categories: demographic, maternal health and cultural; socio-economic; and environmental. The choice of these variables was guided by the literature on determinants of infant mortality. The categorisation of the independent variables was based on theoretical grounds, as well as on the distribution of births with respect to the different variables. A partitioning of the sample according to various background characteristics of its members produced such small subgroups that estimates are unstable and the interpretation of results difficult. Hence, distribution of all variables was collapsed into two broad categories in order to alleviate the problem of excessively small cell size, and all the independent variables included in the regression analysis were dichotomous.

8.2 Summary of the results

The major findings of this study relate to three categories: demographic, maternal health and cultural factors; socio-economic factors; and environmental factors.

8.2.1 Demographic, maternal health and cultural covariates

The first group of variables consists of maternal reproductive characteristics (maternal fertility factors) which are specific to each child and are sometimes referred to as demographic factors. These include biological attributes of birth, for example, sex of the child, maternal age at birth, birth order, preceding birth interval and survival status of previous child. Health service utilisation factors cover matters related to childbirth. Variables examined in this group are place of delivery, assistance at delivery and instrument for cutting the cord. Initiation of breastfeeding within 24 hours and use of colostrum are the cultural variables used in this study.

The analysis demonstrated that maternal age at birth, birth order, preceding birth interval, survival of previous child, assistance at delivery, instrument for cutting the cord, initiation of breastfeeding and utilisation of colostrum had significant gross effects on the risk of dying in infancy in Mewat. Among these, maternal age at birth, preceding birth interval, survival of previous child and utilisation of colostrum had significant net effects on infant mortality.

The risk of infant mortality was found to be highest among children born to mothers aged less than 20 years as compared to 20+ years. The relative risk of dying in infancy for children of mothers aged less than 20 years was more than twice as high as for infants of mothers aged 20 years or older. The increased risk of infant death to young mothers may be due to biological immaturity at early childbearing, inadequate use of ante-natal care by young mothers, poor child care skills which derive partly from inexperience in child rearing, and socio-economic disadvantage.

The analysis demonstrated that short preceding birth intervals were associated with higher risk of dying during infancy, in contrast to longer preceding birth intervals. It appears that in Mewat competition among siblings for household resources and disease transmission were not the main mechanisms through which the preceding birth interval influenced child survival. Rather, it appears that mortality risk attached to short birth interval derives mainly from maternal depletion syndrome. The results from Cox regression show that the effects of the preceding birth interval on infant mortality persisted even after adjustment for the survival status of the preceding sibling which provides evidence that the effects of a short preceding birth interval do not operate entirely through sibling competition. The net effect of controlling for the survival status of the preceding child results in a reduction of the effect of the birth interval which implies that shared family problems would be stronger than sibling competition and disease transmission. Similarly the risk of mortality was higher when the preceding sibling had died in infancy than when it was alive (Table 4.2). Therefore, these results suggest that shared biological or physiological factors affecting the children with short preceding birth interval were more important than sibling competition and disease transmission in the link between the preceding birth interval and infant survival.

The analysis established the tendency of infant and child deaths to cluster in certain Mewati families. Infants whose preceding siblings had died in infancy experienced a significantly greater risk of infant death than infants whose preceding siblings had survived infancy. The reasons for excess risk of mortality among infants preceded by a sibling who died in infancy could be both biological and behavioural. Biological reasons are, for example, inherited genetic conditions such as sickle cell anaemia or the tendency for some mothers to have low birth weight or pre-term babies (Bakketeig *et al.,* 1979). Some women experience more biological problems in pregnancy than others (for example, premature delivery, intrauterine growth retardation) and these problems are likely to be repeated in other pregnancies. Siblings also share the same home environment, family behaviour and child health practices and consequently also any risks associated with these (Curtis *et al.,* 1993). Das Gupta (1990) argues that clustering of deaths is largely a result of basic inability in domestic management, irrespective of education, occupation or wealth of the families; some women are less resourceful and less well organised than others in caring for their children.

None of the childbirth factors had a significant net effect on infant mortality in Mewat. This may be due to lack of variance as only 18 percent of the total births took place in hospitals and only 31 percent of deliveries were attended by a health professional (Table 4.1). Qualitative data brings out the socio-economic and cultural reasons for a high proportion of deliveries taking place at home.

Among cultural factors, utilisation of colostrum had a significant net effect on infant mortality. The relative risk of dying was significantly lower for infants who received colostrum than those who did not. In Mewat the practice of withholding the breast for the first three to five days after birth deprives the child of both nourishment and the vital substances present in the colostrum that facilitate development of the child's immune response system. In Mewat about 74 percent of the infants have their first milk on the third day after birth which means that the infant is denied the benefits of colostrum. Performing a traditional ceremony, lack of breastmilk and describing colostrum as 'bad' milk were the most common reasons observed as the reasons for delaying breastfeeding and discarding colostrum.

8.2.2 Socio-economic covariates

The effects of demographic, health utilisation and cultural factors are not net of the influence of the socio-economic and environmental factors examined in this thesis. Therefore, further analysis of the effects of these proximate variables was presented in Chapter Five and Six where socio-economic and environmental factors were incorporated in the multivariate analysis of infant mortality.

The analysis presented in Chapter Five examined infant mortality differentials in Mewat according to seven important socio-economic factors: mother's education, father's education, mother's work status, father's occupation, type of family, ownership of land, and ownership of livestock. Among all the socio-economic factors, only father's occupation and ownership of land showed a significant relationship with infant mortality in the multivariate analysis. Some previous studies have also shown insignificant net effect of socio-economic characteristics on infant mortality.

Although there has been considerable recent emphasis on the role of paternal education as a determinant of infant and child survival, these data fail to reveal a significant paternal schooling effect. Despite the absence of significant effects, the estimated relative risks suggest that infant survival chances do improve with education. The lack of significance may be due to the relatively small number of cases under analysis, the very low level of literacy and almost universal and prolonged breastfeeding. Women's work status is not significantly associated with infant mortality. This may be due to the fact that working women in this population do not differ from their non-working counterparts in their time spent in direct child care. While some women work in paid labour in agriculture, housewives work as unpaid workers on the farm. Owning land and father's occupation emerged as the most important determinants of infant survival and these are significantly related to infant mortality.

The findings from Chapter Five also support the hypothesis that in the early stages of development, demographic factors are more important than socio-economic factors. This finding from the present study also seems to agree with Mosley and Chen (1984) and suggest that, at least in Mewat, the effect of demographic and cultural factors on infant mortality is immense and socio-economic factors operate through them. The effect of father's occupation and ownership of land was reduced when demographic and cultural factors were taken into account. Their effect was no longer significant at the 10 percent level. After controlling for demographic and socio-economic factors simultaneously, utilisation of colostrum emerged as the most important factor influencing infant mortality in Mewat, followed by maternal age at birth, survival of previous child and preceding birth interval.

The effects of demographic, cultural and socio-economic factors are not net of the influence of the environmental factors examined in this thesis. Therefore further analysis of the effects of these variables was presented in Chapter Six where environmental factors were also incorporated into the multivariate analysis of infant mortality.

8.2.3 Environmental covariates

The household environmental contamination variables used in Chapter Six were the source of drinking water, presence of latrines, type of house, persons per room, presence of separate kitchen, presence of separate bathroom, type of cooking fuel, refuse in courtyard and presence of cattle in the courtyard (Table 6.1). The results provide empirical evidence for a variety of associations between household environmental factors and infant mortality. Hazard analysis suggests that crowding, refuse disposal and location of cattleshed are important correlates of infant mortality. The children with low risk of mortality are those who live in less crowded households which do not keep animals in the courtyard and do not dispose of refuse in the courtyard.

The explanations for the relative lack of association of presence of latrine, separate bathroom and type of cooking fuel with infant mortality are (1) these variables measured only indirectly the quality of environment, and (2) little variability appears to exist in this sample with respect to these variables. Refuse disposal and presence of cattle inside the courtyard are direct and better measures of environmental hygiene and are significantly related to infant survival.

8.2.4 The final hazards model

The final multivariate hazards model incorporated the 'best' mortality predictor from each of the three theoretical aspects (demographic and cultural; socio-economic; and environmental). The empirical data supported Mosley and Chen's theoretical framework. In accordance with the model, socio-economic variables in this data set have indirect effects on infant mortality, while maternal, cultural and environmental variables directly influence infant mortality. The results from the hazards model analysis (Table 6.4, Model 3) indicate that once the maternal, cultural and environmental factors were controlled, the effect of father's occupation and ownership of land was reduced and these variables were no longer significant at 10 percent level. Children in households with land and with fathers not working as labourers are not more likely to survive given equal levels of environmental hazards and maternal and cultural factors. The results from the hazards model analysis (Table 6.4) seem to suggest that high socio-economic status does not give survival advantage for children and the effect of socio-economic determinants on infant mortality is indirect.

On the other hand, room density, disposal of refuse, maternal age at birth and utilisation of colostrum were still significant environmental, maternal and cultural factors when these comparisons were made. This absence of significant results for socio-economic factors is consistent with findings from Bangladesh (Chowdhury, 1982; Phillips and Mozumder, 1984; Majumder, 1989), from Pakistan (Knowles, 1979), from Egypt (Kelley, Khalifa and El-Khorazaty, 1982; Hoodfar, 1984, 1986; Casterline, Cooksey & Ismail, 1989, 1992), and Thailand (Frenzen and Hogan, 1982). In the final model maternal age at birth, utilisation of colostrum, crowding and disposal of refuse emerged as the most important determinants of infant mortality in Mewat in order of importance.

8.2.5 Infant mortality and ethnicity

While the Meos and Non-Meos are both poor by world standards, one group has clearly higher mortality compared to the other. This seems to reflect the different ways they live out their poverty from day to day. Chapter Seven examined the association between ethnicity and infant mortality, controlling for demographic and cultural, socio-economic and environmental factors and demonstrated that Meo infants have a higher risk of mortality than Non-Meos. Although the results were not statistically significant, Meo infants had 30 percent more risk of dying in infancy as compared to Non-Meo infants. Socio-economic and environmental factors were found responsible for infant mortality differentials between Meos and Non-Meos because controlling for socio-economic factors reduces the differences between them in infant mortality.

The qualitative data suggest that there are wide socio-economic differences between Meos and Non-Meos which result in less use of maternal and child health services by Meos. Non-Meos are responding more readily and effectively to social change and development than Meos. Even when the health services are provided free of cost, they are not shared equally by these two communities. Non-Meo mothers were more likely to receive ante-natal care from a doctor or trained nurse and deliver their babies in maternity homes under the supervision of a doctor or trained nurse. They were also more likely to immunise their children and take them to doctors when sick. The higher utilisation of health facilities by Non-Meos was further facilitated by the availability of some means of transport.

8.3 Limitations of the study

The empirical analysis yields results consistent with those of previous researchers using data from different developing countries. However, certain reservations must be made about the adequacy of the models particularly in capturing the considerable demographic effects on infant mortality. Since teenage mothers more often produce low-birthweight infants who are at greater risk for infant death, the increased hazards risk of infant death to teenage mothers may be due to the higher proportion of low-birthweight infants, rather than due to their being teenage mothers *per se*. Unfortunately, the data used in the present study do not include information on infants' birthweight, which, if available, could be used as a control variable in the hazards model analysis.

Secondly, the main limitation of the data is small sample size. Because of the small data set, the mechanisms through which different variables influence infant survival are not completely clear in this study. But given the budget of time and money, quality of information was favoured over size of the sample. The 1996 Mewat Survey, besides being the first comprehensive data set on Mewat, is of better than many other sample surveys conducted for mortality analysis.

Thirdly, Mewat where the study was conducted, is a small part of India; thus caution should be exercised in generalising the findings to the rest of the country.

8.4 The policy implications

The present study of the infant mortality in Mewat gives rise to several suggested policy considerations for the Government of India and Haryana.

First, the organised national family welfare program, which includes efforts to raise female age at marriage, postpone of first birth at least until the age of 20, increase birth intervals and limit family size, has an important role to play in reducing infant mortality as well as enhancing the health status of mothers and children in Mewat region. In Mewat where age at marriage is low, childbearing usually begins before the age of 20 years. Since the effect of maternal age at birth on infant mortality appears to be extremely large, raising age at marriage particularly beyond 18 years in Mewat may prove to be one of the most effective measures to reduce infant mortality. Raising age at marriage will most effectively reduce teenage childbearing, which in turn could significantly improve the infant survival chances in Mewat.

Secondly, social policies attempting to promote early initiation of breastfeeding and utilisation of colostrum could make a major contribution to the reduction of infant mortality in Mewat. They could be promoted through the mass media, particularly radio, which has reached most of the families, as well as education in the schools. Both these measures would make a supportive socio-cultural environment, with the general public becoming more supportive of early initiation of breastfeeding and with increased understanding of the benefits of colostrum to the newborn. Village *dais* could be helpful too in promoting early initiation of breastfeeding as well as utilisation of colostrum because they are still considered to be the first contact persons for delivering the babies.

In view of the large number of deliveries at home without medical attention in Mewat, the existing policy of training traditional birth attendants could be reinforced and better integrated in a comprehensive program of health services. Similarly, these *dais* could be provided with medical instruments such as forceps, scissors, gloves, and thread which are required for deliveries.

Thirdly, Mewat suffers from poverty and children die as a result. However, as Kerala shows at a societal level, and many families show in Mewat on a personal level, it is possible to survive poverty through the practice of better hygiene and full utilisation of available health care resources. To reduce infant mortality associated with environmental contamination, the general public could be educated to a greater awareness of environmental hazards and use of better hygienic practices. Dumping refuse in the living area reflects lack of awareness of hygiene, while crowding is the consequence of poverty. Hence, measures could be taken to eradicate poverty and improve the socioeconomic conditions of the people. While it may take a long time to eradicate poverty, for immediate health benefits, efforts directed towards improving household cleanliness by imparting information about personal hygiene practices, sanitary disposal of faeces and disposal of refuse could increase the overall welfare of the poor. The study has demonstrated that personal hygiene practices can significantly reduce infant mortality, hence I emphasise that specific hygiene messages should be delivered to motivate people to change behaviour and habits that can be life threatening.

Fourthly, infant mortality differentials between the Meo and Non-Meo confirm an important reality: Meo women and children continue to be disadvantaged across key facets of Mewati society. In particular, the health care system is biased towards relatively advantaged Non-Meo families; those who are more educated, landed and wealthy. Rates of infant mortality are often used to gauge the overall quality of life of a population and the ethnic differential in infant mortality indicates continuing inequality in life chances and quality of life for Meo members of this society. The analysis suggests that eliminating the association between ethnicity and infant mortality may involve progressive actions towards eliminating differences in the socioeconomic, maternal health, and health care factors that are also instrumental in the continuation of the mortality differentials. The prevailing health system cannot generate trust among Meos about the effectiveness of government medical care. Hence, the system needs to be improved.

8.5 Directions for future research

Since the analysis presented in this thesis, as well as much of the previous research, has examined primarily the intermediate determinants of infant mortality, I hope that future research is directed towards developing a better understanding of the causal mechanisms through which different covariates affect infant mortality in developing countries and towards the means for improving infant survival in these societies.

Although this study has demonstrated the utility of hazards model methodology as a powerful tool for estimating the relative mortality risks in a population, especially when covariates are numerous, investigating the causal pathways through which different variables influence infant mortality would require using a different approach, as well as more detailed data on certain independent variables.

It was not possible to make fully comprehensive investigation of the various factors affecting infant mortality because the study was based on a small sample. However, the study did reveal some important determinants of infant mortality in Mewat. I suggest that further research using a larger data set would make possible an in-depth analysis of the determinants of infant mortality in Haryana State which would be of great interest to policy makers.

8.6 Conclusion

The thesis suggests that raising the maternal age at birth, giving colostrum to newborns, living in less crowded houses and not keeping the refuse in the courtyard could substantially reduce infant mortality in Mewat. The analysis also suggests that eliminating the association between ethnicity and infant mortality may involve progressive actions towards eliminating differences in the socioeconomic, environmental, maternal health, and health care factors that are also instrumental in the continuation of the mortality differentials. But it would be simplistic to assume that once Meos know that demographic, socioeconomic, and environmental factors improve the life chances of their infants, they will move voluntarily to more favoured statuses, or that such a change will instantaneously improve their survival prospects. Unfortunately there are individual, social structural, and cohort obstacles to overcoming social inequalities. Moreover, even in countries that experience a general and rapid decline in infant mortality, it has not been possible to fully overcome the mortality gap between the social classes (Vallin, 1980). However this thesis, by identifying ways to improve Meo infants' survival chances, suggests a step towards closing the ethnic gap in infant mortality. Demographic, socioeconomic, and environmental factors profoundly affect ethnic differences in infant mortality. Every infant is at risk of dying, but how adeptly that risk is dealt with determines whether infants live or die in Mewat.

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Appendix A 1.1 Infant mortality trends in India and Haryana State, 1981- 1995

Year	India (IMR)	Haryana State (IMR)
1981	110	101
1982	105	93
1983	105	91
1984	104	101
1985	97	85
1986	96	85
1987	95	87
1988	94	90
1989	91	82
1990	80	69
1991	80[a]	68
1992	79[a]	75
1993	74[a]	66
1994	74[a]	70
1995	74[a]	69

Source: Registrar General of India (1997)

Note: [a] Excludes Jammu & Kashmir and Mizoram.

Appendix A 2.1 Neonatal, Post-neonatal and infant mortality rates[a] by sex, Mewat, 1996

Sex	Number of births	Neonatal mortality	Post-neonatal mortality	Infant mortality
Male	329	52	30	82
Female	306	46	55	101
Total	635	49	42	91

Source: Mewat field data, 1996

Note: [a] The rates are per thousand live births that occurred between 1993-1995.

Appendix A 4.1 Summary results[a] from Cox proportional hazards model adjusted for the effect of maternal age at birth and birth on infant mortality, Mewat, 1996

Covariates	Regression coefficient β	Exp (β)	SE	95% confidence interval
Maternal age at birth				
20 + years	0.0000	1.0000		
< 20 years	0.9294***	2.5330	0.2626	1.5139 - 4.2382
Birth order				
2nd +	0.0000	1.0000		
1st	-0.1775	0.8373	0.2796	0.4841 - 1.4484

Source: Mewat field data, 1996
Note: ***p<0.000

Appendix A 4.1 Summary results[a] from Cox proportional hazards model adjusted for the effect of birth interval and survival status of the preceding child on infant mortality, Mewat, 1996

Covariates	Regression coefficient β	Exp (β)	SE	95% confidence interval
Preceding birth interval				
24 + months & 1st births	0.0000	1.0000		
< 24 months	0.6244**	1.8672	0.2773	1.0843 - 3.2153
Survival of previous child				
Alive & 1st births	0.0000	1.0000		
Dead	0.2828	1.3269	0.2783	0.7691 - 2.2892

Source: Mewat field data, 1996.
Note: **$p<0.05$

Appendix A 7.1 Distribution of live births and deaths among Meos and Non-Meos by categories of demographic, maternal health and cultural variables, Mewat, 1996

	Non-Meos		Meos		Total	
	Exposed births	Infant deaths	Exposed births	Infant deaths	Exposed births	Infant deaths
Sex of the child						
Male	217	16	292	26	509	42
Female	170	14	271	27	441	41
Maternal age at child birth						
Less than 20	184	21	177	27	361	48
20+ years	203	9	386	26	589	35
Order of birth						
1st birth	102	11	119	15	221	26
2nd +	285	19	444	38	729	57
Preceding birth interval						
Less than 24 months	105	14	191	27	296	41
24+ months & 1st births	282	16	372	26	654	42
Survival of previous child						
Alive & 1st births	287	17	369	28	656	45
Dead	100	13	194	25	294	38
Assistance at delivery						
Professional (Doctor/ nurse/ANM/ LHV)	141	6	135	7	276	13
Traditional Birth Attendant (TBA)	246	24	428	46	674	70
Instrument for cutting the cord						
Scissors	213	12	189	11	402	23
Blade/ knife/ sickle	174	18	374	42	548	60
Initiation of breastfeeding within 24 hours						
Yes	178	7	231	10	409	17
No & never breastfed	209	23	332	43	541	66
Utilisation of colostrum						
Yes	139	5	194	7	333	12
No & never breastfed	248	25	369	46	617	71

Source: Mewat field data, 1996

Appendix A 7.2 Distribution of live births and deaths among Meos and Non-Meos by categories of socio-economic variables, Mewat, 1996

	Non-Meos		Meos		Total	
	Exposed births	Infant deaths	Exposed births	Infant deaths	Exposed births	Infant deaths
Maternal education						
Literate with some education	115	6	133	6	248	12
Illiterate	272	24	430	47	702	71
Paternal education						
Literate with some education	255	15	200	14	455	29
Illiterate	132	15	363	39	495	54
Father working as labourer						
No	240	13	241	15	481	28
Yes	147	17	322	38	469	55
Type of family						
Joint/ extended	205	14	193	11	398	25
Nuclear	182	16	370	42	552	58
Owning any land						
Yes	240	13	278	18	518	31
No	147	17	285	35	432	52
Owning any livestock						
Yes	309	23	467	41	776	64
No	78	7	96	12	174	19

Source: Mewat field data, 1996

Appendix A 7.3 Distribution of live births and deaths among Meos and Non-Meos by categories of environmental variables, Mewat, 1996

	Non-Meos		Meos		Total	
	Exposed births	Infant deaths	Exposed births	Infant deaths	Exposed births	Infant deaths
Source of drinking water						
Piped	165	8	153	9	318	17
Non-piped	222	22	410	44	632	66
Presence of latrines						
Yes	71	5	24	2	95	7
No	316	25	539	51	855	76
Type of house						
Pukka/ cemented	112	6	102	6	214	12
Kachcha/ not cemented	275	24	461	47	736	71
Persons per room						
3 or less	203	13	243	4	446	17
More than 3	184	17	320	49	504	66
Presence of separate kitchen						
Yes	142	8	170	10	312	18
No	245	22	393	43	638	65
Refuse in courtyard						
No	206	7	100	6	642	13
Yes	181	23	461	47	306	70
Animals in the courtyard						
No	259	17	382	32	641	49
Yes	128	13	181	21	309	34

Source: Mewat field data, 1996

Appendix A 7.4 Summary results from Cox proportional hazards model for the effect of demographic, maternal health and cultural factors on infant mortality of Meos and Non-Meos (Model 1), Mewat, 1996

Covariates	Regression coefficient β	Exp (β)	SE	95% confidence interval
Ethnicity				
Non-Meos	0.0000	1.0000		
Meos	0.2802	1.3072	0.2395	0.7800- 1.9941
Maternal age at child birth				
20 + years	0.0000	1.0000		
Less 20 years	1.0834***	2.9548	0.2796	1.7083- 5.1109
Birth order				
2nd +	0.0000	1.0000		
1st birth	0.3188	1.3755	0.3298	0.7207- 2.6252
Preceding birth interval				
24 + months & 1st births	0.0000	1.0000		
Less than 24 months	0.4839*	1.6224	0.2782	0.9405- 2.7987
Survival of previous child				
Alive & 1st births	0.0000	1.0000		
Dead	0.9576**	2.6055	0.3237	1.3814-4.9143
Assistance at delivery				
Professional	0.0000	1.0000		
Traditional	0.0581	1.0598	0.4371	0.4499- 2.4963
Instrument for cutting the cord				
Scissors	0.0000	1.0000		
Blade/ knife / sickle	0.4330	1.5420	0.3514	0.7744- 3.0704
Initiation of breastfeeding within 24 hours				
Yes	0.0000	1.0000		
No	0.5146	1.6729	0.4733	0.6616- 4.2303
Utilisation of colostrum				
Yes	0.0000	1.0000		
No	0.7806	2.1828	0.5425	0.7537- 6.3218

Source: Mewat field data, 1996

Note: Model contained all variables listed in Table 4.2 that were significant at $p<0.10$ with addition of ethnicity variable.

*p<0.10

***p<0.001

***p<0.000

Appendix A 7.5 Summary results from Cox proportional hazards model for the effect of demographic, cultural and socieconomic factors on infant mortality of Meos and Non-Meos (Model 2), Mewat, 1996

Covariates	Regression coefficient β	Exp (β)	SE	95% confidence interval
Ethnicity				
Non-Meos	0.0000	1.0000		
Meos	0.2983	1.2475	0.2374	0.8461- 2.1460
Maternal age at child birth				
20 + years	0.0000	1.0000		
Less than 20 years	1.1292 ***	3.0932	0.2520	1.8875- 5.0692
Preceding birth interval				
24 + months & 1st births	0.0000	1.0000		
Less than 24 months	0.5476*	1.7291	0.2769	1.0049 - 2.9754
Survival of previous child				
Alive & 1st births	0.0000	1.0000		
Dead	0.5431	1.7214	0.3719	0.8305 - 3.5680
Utilisation of colostrum				
Yes	0.0000	1.0000		
No	1.3051***	3.6880	0.3190	1.9735 - 6.8922
Father working as labourer				
No	0.0000	1.0000		
Yes	-0.01470.	0.9854	0.2694	0.5811 - 1.6708
Owning any land				
Yes	0.0000	1.0000		
No	0.2898	1.3361	0.3172	0.7176 - 2.4880

Source: Mewat field data, 1996

Note: Model contained all variables listed in Table 5.4 that were significant at $p<0.10$ with addition of ethnicity variable.
**$p<0.05$
***$p<0.000$

Appendix A 7.6 Summary results from Cox proportional hazards model for the effect of demographic, cultural and environmental factors on infant mortality of Meos and Non-Meos (Model 3), Mewat, 1996

Covariates	Regression coefficient β	Exp (β)	SE	95% confidence interval
Ethnicity				
Non-Meos	0.0000	1.0000		
Meos	0.2623	1.1999	0.2473	0.8006 - 2.1105
Maternal age at child birth				
20 + years	0.0000	1.0000		
Less than 20 years	1.3181 ***	3.7378	0.2635	2.2301 - 6.2648
Preceding birth interval				
24 + months & 1st births	0.0000	1.0000		
Less than 24 months	0.3894*	1.4761	0.2669	0.8748 - 2.4905
Survival of previous child				
Alive & 1st births	0.0000	1.0000		
Dead	0.5194*	1.6811	0.2904	0.9516 - 2.9698
Utilisation of colostrum				
Yes	0.0000	1.0000		
No	1.1128***	3.0428	0.3202	1.6245 - 5.6993
Persons per room				
3 or less	0.0000	1.0000		
More than 3	1.1471***	3.1490	0.2965	1.7612 - 5.6304
Refuse in the courtyard				
No	0.0000	1.0000		
Yes	0.8459**	2.3301	0.3065	1.7612 - 5.6304
Animals in the courtyard				
No	0.0000	1.0000		
Yes	0.3161***	1.3718	0.2333	0.8683 - 2.1671

Source: Mewat field data 1996

Notes: Model contained all significant demographic and environmental covariates with addition of ethnicity variable in the model.

*p<0.10

**p<0.001

***p<0.000

Appendix A 7.7 Summary results from Cox proportional hazards model for the effect of environmental, socio-economic, demographic, and cultural factors on infant mortality of Meos and Non-Meos (Model 4), Mewat, 1996

Covariates	Regression coefficient β	Exp (β)	SE	95% confidence interval
Ethnicity				
Non-Meos	0.0000	1.0000		
Meos	0.2658	1.1044	0.2486	0.8013 - 2.1234
Persons per room				
3 or less	0.0000	1.0000		
More than 3	1.1376***	3.1194	0.3011	1.7288 - 5.6285
Refuse in the courtyard				
No	0.0000	1.0000		
Yes	0.8511**	2.3422	0.3075	1.2820 - 4.2791
Animals in the courtyard				
No	0.0000	1.0000		
Yes	0.3143	1.3692	0.2344	0.8649 - 2.1676
Father working as labourer				
No	0.0000	1.0000		
Yes	-0.0123	0.9878	0.2548	0.5994 - 1.6277
Owning any land				
Yes	0.0000	1.0000		
No	0.0640	1.0661	0.3087	0.5821 - 1.9525
Maternal age at birth				
20+ years	0.0000	1.0000		
Less than 20 years	1.3174***	3.7337	0.2641	2.2252 - 6.2648
Preceding birth interval				
24+ months & 1st births	0.0000	1.0000		
Less than 24 months	0.3885	1.4748	0.2681	0.8719 - 2.4944
Survival of previous child				
Alive & 1st births	0.0000	1.0000		
Dead	0.4860	1.6257	0.3384	0.8375 - 3.1559
Utilisation of colostrum				
Yes	0.0000	1.0000		
No	1.1159***	3.0523	0.3215	1.6253 - 5.7320

Source: Mewat field data 1996

Notes: Model contained all covariates listed in Table 6.4 with addition of ethnicity variable in the model.
***p<0.000
**P<0.001

Appendix A 7.8 Summary results from Cox proportional hazards model for the effect of socio-economic factors on infant mortality of Meos and Non-Meos, Mewat, 1996

Covariates	Regression coefficient β	Exp (β)	SE	95% confidence interval
Ethnicity				
Non-Meos	0.0000	1.0000		
Meos	-0.0156	0.9845	0.2465	0.6073 - 1.5961
Education of mother				
Literate	0.0000	1.0000		
Illiterate	0.3710	1.4492	0.3782	0.6906 - 3.0411
Education of father				
Literate	0.0000	1.0000		
Illiterate	0.0748	1.0777	0.2945	0.6051 - 1.9195
Father working as labourer				
No	0.0000	1.0000		
Yes	0.4351*	1.5451	0.2661	0.9172 - 2.6027
Type of family				
Joint/extended	0.0000	1.0000		
Nuclear	0.1871	1.2058	0.2739	0.7049 - 2.0625
Owning any land				
Yes	0.0000	1.0000		
No	0.3337	1.3961	0.2921	0.7875 - 2.4750
Owning any livestock				
Yes	0.0000	1.0000		
No	0.3157	1.3721	0.2707	0.8076 - 2.3309

Source: Mewat field data 1996

Notes: Model contained all variables listed in Table 5.3 with addition of ethnicity variable in the model.
*$p<0.01$

Appendix A 7.9 Summary results from Cox proportional hazards model for the effect of environmental factors on infant mortality of Meos and Non-Meos, Mewat, 1996

Covariates	Regression coefficient β	Exp (β)	SE	95% confidence interval
Ethnicity				
Non-Meos	0.0000	1.0000		
Meos	-0.0549	0.9465	0.2373	0.5945 - 1.5071
Source of drinking water				
Piped	0.0000	1.0000		
Non-piped	0.4137	1.5124	0.3287	0.7940 - 2.8806
Type of house				
Pukka/ cemented	0.0000	1.0000		
Kaccha/ not cemented	-0.4055	0.6666	0.3857	0.3130 - 1.4197
Persons per room				
3 or less	0.0000	1.0000		
More than 3	1.1258***	3.0828	0.3009	1.7093 - 5.5599
Presence of separate kitchen				
Yes	0.0000	1.0000		
No	0.2620	1.2995	0.2868	0.7407 - 2.2799
Refuse in the courtyard				
No	0.0000	1.0000		
Yes	0.8773**	2.4044	0.3166	1.2926 - 4.4723
Animals in the courtyard				
No	0.0000*	1.0000		
Yes	0.4819	1.6192	0.2292	1.0332 - 2.5375

Source: Mewat field data 1996

Notes: Model contained all covariates listed in Table 6.3 with addition of ethnicity variable in the model.
*p<0.05
**p<0.001
***p<0.000

APPENDIX B

Themes used in in-depth interviews

A.

1. Knowledge about the legal age at marriage, general views and beliefs about marriage age
2. Perceptions, beliefs and practices associated with pregnancy, child birth and postanatal period:
    - 2.1 How do the women view pregnancy and childbirth, whether carrying a child and giving birth risky?
    - 2.2 Do they eat normal food during pregnancy and do normal household work during pregnancy?
    - 2.3 Do they go for ant-natal care during pregnancy?
    - 2.4 How do they choose the place to deliver the baby?
    - 2.5 What makes a woman decide to see a *dai* for pregnancy check up and assist at delivery?
    - 2.6 How much does it cost of such services?
    - 2.7 What type of advice do they usually obtain from *dais*?
    - 2.8 What do women view such advices? Do they follow? What are the outcomes of such practices?
    - 2.9 Dietary practices during the postnatal period
    - 2.10 How long do the women abstain from sexual intercourse after child birth?
3. Views, perceptions and beliefs about breastfeeding and use of colostrum.
4. Views about the birth of a son and daughter.
5. Local perceptions about illness during infancy and treatment.
6. Attitudes towards Integrated Child Development Services (ICDS) and other government health services.
7. Use of maternal and child health care services such as child immunisation.
8. Views and attitude about children's education, particularly, girls' education.

9. Perceptions about household environment such as do the people use the toilets if they have one? How do they view the household environment?

B. Information to be collected from *dais:*

1. Personal and socio-economic background
2. Have they undergone some training?
3. What do they usually perform to women during pregnancy, delivery, and postnatal period?
4. What danger signs do they look for in women who are pregnant, about to deliver, and after delivery?
5. What do they usually do to treat such problems?
6. What prenatal restrictions do they usually prescribe? Why?
7. Do they give special advice to pregnant and lactating women? What type of advice?
8. Delivery practices adopted by them.
9. With regard to the umbilical cord, what instrument do they normally use to cut the cord, how do they take care of the cord?
10. How do they usually treat a newborn?
11. Patterns of management of labour in case of normal and abnormal.

C. Information to be collected from Child Development Project Officer about functioning of ICDS, community participation in the program, relative use of various services provided by ICDS by Meo and Non-Meo women.

APPENDIX C

Strictly confidential
For research purpose only

QUESTIONNAIRE FOR CHILD SURVIVAL SURVEY IN MEWAT REGION OF HARYANA, INDIA, 1996

HOUSEHOLD IDENTIFICATION

NAME OF THE BLOCK

NAME OF THE VILLAGE

NAME OF THE HOUSEHOLD HEAD

ADDRESS OF THE HOUSEHOLD

DATE OF INTERVIEW

NAME OF THE INTERVIEWER

	FIELD EDITED BY	OFFICE EDITED BY
NAME		
DATE		

A. PARTICULARS ABOUT HOUSEHOLD

1. Name of the respondent

2. Name of the spouse

3. Religion
   1. Hindu
   2. Muslim
   3. Sikh
   4. Christian
   5. Other (specify)

4. Ethnicity
   1. Meo
   2. Non-Meo

5. Do you belong to scheduled caste/ scheduled tribe?
   1. Yes
   2. No

6. Type of family
   1. Nuclear
   2. Joint
   3. Extended

7. How many total persons including children live in this household ?
   Total number

9. Does this household own any agricultural land?
   1. Yes
   2. No

10.. Does this household own any livestock?
   1. Yes
   2. No

B. HOUSING AND SANITATION

10. What is the main source of drinking water for members of your household
   1. Piped water
   2. Handpump
   3. Well
   4. Tank / pond
   5. River / stream
   6. Any other (specify)

11. Is drinking water boiled before being consumed?
   1. Yes
   2. No

12. What kind of toilet facility does your household have?
   1. Flush toilet
   2. Pit toilet / latrine
   3. No facility / bush / field
   4. Other (specify)

13. If there is no toilet facility, reason for not having it
   1. No money to get it constructed
   2. No place
   3. No system of cleaning the latrine
   4. Do not like
   5. Other (specify)

14. What is the main source of lighting for your household?
   1. Electricity
   2. Kerosene
   3. Gas
   4. Oil
   5. Other (specify)

15. How many rooms are there in your household?
   Number of rooms

16. How many rooms are used for sleeping
   Number of rooms

17. Do you have a separate bathroom
   1. Yes
   2. No

18. Do you have a separate room which is used as a kitchen?
   1. Yes
   2. No

19. What type of fuel does your household mainly use for cooking
   1. Wood
   2. Cow dung cake
   3. Coal / coke / lignite
   4. Charcoal
   5. Kerosene
   6. Electricity
   7. Liquid petroleum gas
   8. Bio-gas
   9. Other (specify)

20. Type of house (record observation, roof, walls, and floor)
   1. *Pukka*
   2. *Kachcha*
   3. Semi-*pukka*

21. Where do you usually keep the animals at night?
   1. Inside the house in the courtyard
   2. Separate place for cattleshed
   3. Outside the house
   4. No animals

22. Where do you dispose of the household garbage?
   1. In the courtyard
   2. Dustbin
   3. Street
   4. Other (specify)

23. Does you household own any of the following?

	Yes	No
A sewing machine		
A clock or watch		
A fan		
A radio or transistor		
A refrigerator		
A television		
A bicycle		
A motorcycle or scooter		
A car		
A bullock cart		
A thresher		
A tractor		

C. RESPONDENT'S BACKGROUND

24. In which month and year were you born?
Day
Month
Year

25. How old were you at your last birthday
Age in completed years

26. How old were you at your marriage?
Years

27. For how long have you been married?
Years

28. What is your date of marriage
Date
Month
Year

29. What is the highest level of schooling you ever attended
   1. Never schooling
   2. Primary (1-5 yrs)
   3. Secondary (6-8 yrs)
   4. Matric (9-10 yrs)
   5. Higher secondary (11 and higher)

30. What is the highest grade/ year you successfully completed at school?
Year completed

31. Were you in any employment for which you were paid in cash or kind during last three years (1993-1996)?
   1. Yes
   2. No

32. What is the highest level of schooling your husband attended?
   1. No schooling
   2. Primary
   2. Primary (1-5 yrs)
   3. Secondary (6-8 yrs)
   4. Matric (9-10 yrs)
   5. Higher secondary (11 and higher)

33. What is the highest grade/ year your husband successfully completed at school?
Year completed
Not sure

34. What is your husband's occupation?
   1. Govt. service
   2. Private service
   3. Farmer
   4. Own business
   5. Labourer
   6. Other (specify)

D. FERTILITY AND MORTALITY

35. Have you ever given a live birth?
   1. Yes
   2. No

36. How old were you at the time of your first birth?
Age in years

37. How many sons and how many daughters have you had during your life?
Sons
Daughters
Total

38 Have you ever given a birth to a child who was born alive but later died?
Sons
Daughters
Total

39. How many sons and how many daughters are living with you?
Sons
Daughters
Total

40. How many sons and daughters are living elsewhere?
Sons
Daughters
Total

41. BIRTH HISTORY FOR ALL BIRTHS DURING YOUR LIFE

Birth order	Name of the child	Date of birth	Sex of the child	Mother's age at each birth	Survival status Alive 1 Dead 2	if dead, age at death (in days/ months)	Whether a beneficiary of ICDS
1							
2							
3							
..							
..							

E. TYPE OF DELIVERY CARE

All deliveries during last five years (Holi festival 1991 to Holi festival 1996). If there are more than three birth, record only last three births.

		Last birth	Next to last birth	Second-from-last birth
42.	Where did you give birth to (name)?	1. At home 2. Govt hospital 3. Pvt hospital 4. Other (specify)	1. At home 2. Govt hospital 3. Pvt hospital 4. Other (specify)	1. At home 2. Govt hospital 3. Pvt hospital 4. Other (specify)
43.	Who assisted with the delivery (name)?	1. Doctor 2. Nurse 3. ANM / LHV 4. *Dai* 5. Relatives 6. Other (specify)	1. Doctor 2. Nurse 3. ANM / LHV 4. *Dai* 5. Relatives 6. Other (specify)	1. Doctor 2. Nurse 3. ANM / LHV 4. *Dai* 5. Relatives 6. Other (specify)
44.	Instrument used for cutting the cord (name)	1. Sickle 2. Blade 3. Scissors 4. Other (specify)	1. Sickle 2. Blade 3. Scissors 4. Other (specify)	1. Sickle 2. Blade 3. Scissors 4. Other (specify)
45.	Material applied to the cord	1. Mud or ash 2. Oil with turmeri 3. Boric powder 4. Other (specify)	1. Mud or ash 2. Oil with turmeri 3. Boric powder 4. Other (specify)	1. Mud or ash 2. Oil with turmeri 3. Boric powder 4. Other (specify)

F. BREAST FEEDING PRACTICE

All deliveries during last five years (Holi festival 1991 to Holi festival 1996). If there are more than three births, record only last three births.

		Last birth	Next to last birth	Second-from-last birth
46.	Did you ever breastfeed (name)?	1. Yes-----47 2. No	1. Yes-----47 2. No	1. Yes-----47 2. No
47.	If no, why did not you breastfeed (name)?	1. Mother ill/ weak 2. Child ill/ weak 3. Child died 4. Nipple problem 5. Insufficient milk 6. Mother working 7. Child refused 8. Other (specify)	1. Mother ill/ weak 2. Child ill/ weak 3. Child died 4. Nipple problem 5. Insufficient milk 6. Mother working 7. Child refused 8. Other (specify)	1. Mother ill/ weal 2. Child ill/ weak 3. Child died 4. Nipple problem 5. Insufficient mill 6. Mother workin 7. Child refused 8. Other (specify)
48.	If yes, how long after birth did you first put (name) to the breast	1. Immediately 2. Less than 24 hours 3. More than a day	1. Immediately 2. Less than 24 hours 3. More than a day	1. Immediately 2. Less than 24 hours 3. More than a da
49.	Did you squeeze out the milk from the breast before you put (name) to the breast	1. Yes 2. No---------50	1. Yes 2. No---------50	1. Yes 2. No---------50
50.	If yes, why?			
51.	Are you still breastfeeding (name)	1. Yes-------52 2. No	1. Yes-------52 2. No	1. Yes-------52 2. No

52.	Why did you stop breastfeeding (name)			
		1. Mother ill/ weak 2. Child ill/ weak 3. Child died 4. Nipple problem 5. Insufficient milk 6. Mother working 7. Child refused 8. Weaning age 9. Became pregnant 10. Started using contraception 11. Other (specify)	1. Mother ill/ weak 2. Child ill/ weak 3. Child died 4. Nipple problem 5. Insufficient milk 6. Mother working 7. Child refused 8. Weaning age 9. Became pregnant 10. Started using contraception 11. Other (specify)	1. Mother ill/ weak 2. Child ill/ weak 3. Child died 4. Nipple problem 5. Insufficient milk 6. Mother working 7. Child refused 8. Weaning age 9. Became pregnant 10. Started using contraception 11. Other (specify)
53.	For how many months did you breastfeed (name)?			
		Months Until died Still breastfeeding	Months Until died Still breastfeeding	Months Until died Still breastfeeding
54.	How many months old was (name) when you started giving him/ her something else to drink or eat (other than breastmilk)			
		Months		
55.	After how many days did you start household work after delivery?			
		Days	Days	Days
56	After how many days did you start going for work after delivery (in case of working woman)			
		Days	Days	Days
57.	Who took care of the child when you went out for work?			
		1. Mother-in-law or or someone else in the house 2. Elder siblings 3. Taken to the place of work 4. Neighbours 5. Other (specify)	1. Mother-in-law or someone else in the house 2. Elder siblings 3. Taken to the place of work 4. Neighbours 5. Other (specify)	1. Mother-in-law or someone else in the house 2. Elder siblings 3. Taken to the place of work 4. Neighbours 5. Other (specify)

G. MORTALITY SCHEDULE

All deaths of children born during last five years (Holi festival 1991 to Holi festival 1996). If there are more than three births, record only last three births.

		Last birth	Next to last birth	Second-from-last birth
58.	Causes of death	1. Accident 2. Birth disorder 3. Fever 4. Cholera 6. Pneumonia 7. Jaundice 8. Measles 9. Tetanus 10. Diphtheria 11. Diarrhoea 12. Dysentery 13. Other (specify)	1. Accident 2. Birth disorder 3. Fever 4. Cholera 6. Pneumonia 7. Jaundice 8. Measles 9. Tetanus 10. Diphtheria 11. Diarrhoea 12. Dysentery 13. Other (specify)	1. Accident 2. Birth disorder 3. Fever 4. Cholera 6. Pneumonia 7. Jaundice 8. Measles 9. Tetanus 10. Diphtheria 11. Diarrhoea 12. Dysentery 13. Other (specify)
59.	Medical facility at the time of death	1. No medical facility 2. Trained medical practitioner 3. Others	1. No medical facility 2. Trained medical practitioner 3. Others	1. No medical facility 2. Trained medical practitioner 3. Others

H. EFFECTIVENESS OF DELIVERY OF INTEGRATED CHILD DEVELOPMENT SERVICES REGARDING WOMEN

60. What is an *Anganwadi?*

61 Knowledge about ICDS and its various components
   1. Supplementary Nutrition Program
   2. Ante-natal health check up (for expectant mothers)
   3. Post-natal health check up (for nursing mothers)
   4. Immunisation
   5. Functional literacy for adult woman (FLAW)
   6. Referral services
   7. Pre-school education
   8. Health and Nutrition Education (HNE) to women

62. Are you an beneficiary of ICDS program?
   1. Yes
   2. No

63. Type of beneficiary of ICDS program
   1. As expectant mother
   2. As nursing mother
   3. As any mother in the reproductive age group
   4. Under FLAW

64. Are you a beneficiary of Supplementary Nutrition Program?
   1. Yes
   2. No----------70

65. If yes, do you avail/ utilise it?
   1. Yes
   2. No----------69

66. If yes, do you share the Supplementary food with non-beneficiaries?
   1. Yes
   2. No----------67

67. If yes, who are the non-beneficiaries?

68. Is the quantity of food reduced in the house because of the supplementary food provided to you?
   1. Yes
   2. No

69. When you go to get Supplementary food, do you get it:
   1. Within one hour
   2. 1-2 hours
   3. More than three hours
   4. Sometimes not at all

70. If you do not utilise the supplementary nutrition provided by the *Anganwadi* Worker, what are the reasons for that?

71. Are you aware of Nutrition and Health Education (NHE) sessions conducted by the *Anganwadi Worker*?
   1. Yes
   2. No

72. If yes, how many NHE sessions were conducted during the last three months?
   1. None
   2. One
   3. Two
   4. Three
   5. More than three

73. In how many NHE sessions did you participate?
   1. None
   2. One
   3. Two
   4. Three
   5. More than three

74. If you did not participate in any of NHE sessions during the last three months, what are the reasons?

75. Did the *Anganwadi Worker* motivate you to get tetanus and TT Booster during your last pregnancy from Lady Health Visitor (LHV)?
   1. Yes
   2. No

76. Did you take Iron and Folic Acid tablets during your last pregnancy?
   1. Did not get at all
   2. Got from LHV
   3. From any other source

77. From whom do you normally seek treatment for illness?

78. Do you know that the *Anganwadi Worker* can provide medicines to sick beneficiaries in her village?
   1. Yes
   2. No

79. Did you approach the *Anganwadi Worker* for medical relief during the last three months?
   1. Yes
   2. No, though there was a need----------82
   3. No, there was no need

80. If yes, what was the health problem?

81. Did the *Anganwadi Worker* give any medicine?
   1. Yes
   2. No

82. What was the result of that medicine?

1. Full relief
2. Partial relief
3. No relief

83. Why you did not approach AWW for medical relief, though there was a need?

84. Whether you had been referred to the health worker / sub centre/ Primary Health Centre by Anganwadi Worker during the last three months?

1. Yes
2. No----------88

85. If yes, whether followed

1. Yes
2. No----------88

86. If followed, what was the outcome?

1. Full relief
2. Partial relief
3. No relief

87. Were you satisfied with the services you had received at the referred health center?

1. Yes
2. No

88. Did you get prompt attention at the referred health center?

1. Yes
2. No

89. Whether the *Anganwadi* Worker makes an effort to make home visits?

1. Yes
2. No

90. *Anganwadi* workers' attitude towards you?

1. Courteous
2. Indifferent
3. Harsh

91. Do you think that the services of ICDS should be continued?

1. Yes
2. No----------92

92. If yes, why?

93. If not, why?

I. EFFECTIVENESS OF DELIVERY OF INTEGRATED SERVICES REGARDING CHILDREN

		Last birth	Next to last birth	Second-from-last birth
94.	Whether the child (name) availed the following benefits from ICDS 1. BCG-at birth 2. Polio- at birth 3. DPT-1st dose (3rd month) 2nd dose (5th month) 3rd dose (7th month) 4. Measels vaccine (10th month) 5. DPT Booster (12th month to 16th month) 6. Regular health check up 7. Irregular health check up 8. Vitamin 'A' tablets 9. Iron and Folic acid tablets 10. Supplementary Nutrition 11. Pre-school education	Yes No	Yes No	Yes No
95.	If the child (name) a beneficiary of Supplementary Nutrition, whether he/she shares that food with their siblings in the household	1. Yes 2. No	1. Yes 2. No	1. Yes 2. No
96.	If yes, with how many?	1. One 2. Two 3. Three 4. Four or more	1. One 2. Two 3. Three 4. Four or more	1. One 2. Two 3. Three 4. Four or more
97.	Is the quantity of his/ her (name) food in the house reduced because of Supplementary Nutrition?	1. Yes 2. No	1. Yes 2. No	1. Yes 2. No
98.	If yes, in what way?			
99.	If the child (name) is not availing/ utilising Supplementary Nutrition what are the reasons for that?			

100.	For how long does the child (name) remain each day in the *Anganwadi*?	1. Less than 3 hours 2. 3 to 5 hours 3. More than 5 hours	1. Less than 3 hours 2. 3 to 5 hours 3. More than 5 hours	1. Less than 3 hours 2. 3 to 5 hours 3. More than 5 hours
101	Why do you send the child (name) to *Anganwadi*?			

VILLAGE QUESTIONNAIRE FOR CHILD SURVIVAL SURVEY IN MEWAT REGION OF HARYANA, INDIA, 1996

1. Name of the village
2. Name of the block
3. Name of the village headman
4. Date of conducting the interview
5. Distance from the nearest town (in kilometers)
6. Distance from the Block Headquarters (in kilometers)
7. Distance from the Tehsil Headquarters (in kilometers)
8. Distance from the nearest railway station (in kilometers)
9. Distance from the nearest bus stand (in kilometers)
10. Whether the village is connected by all-weather road
    1. Yes----------12
    2. No
11. Distance from the nearest *pukka* road
12. Main source of drinking water in the village
    1. Piped water
    2. Open well
    3. Tube well / bore well
    4. River / spring / pond / lake
    5. Other (specify)
13. Is the village electrified
    1. Yes
    2. No
14. Educational facility in the village

	Yes (1)	No (2)
Primary school		
Middle school		
Secondary school		
Higher secondary school		
College		
Anganwadi		

15. Health facilities:

	Yes (1)	No (2)
Primary Health Centre		
Sub-Centre		
Government hospital		
5. Private hospital		
Dispensary / clinic		
Village Health guide		
Trained birth attendant		
Mobile Health Unit / visit		

16. Other facilities: whether available in the village

	Yes (1)	No (2)
Bank		
Credit cooperative society		
Agricultural cooperative society		
Milk cooperative society		
Post office		
Fair price shop		
Pharmacy / medical shop		
Cinema house / tent		

17. Major source of information for filling in the village Schedule:

1. *Sarpanch*
2. *Patwari*
3. School teacher
4. Health personnel
5. *Anganwadi Worker*
6. Others (specify)

18. Any other relevant comments :